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The objects of the American Geographical Society are to collect and disseminate geographical information by discussion, lectures, and publications; to establish in the chief city of the United States a place where may be obtained accurate information on every part of the globe; and to encourage such exploring expeditions as seem likely to result in valuable discoveries in geography and the related sciences.

The American Geographical Society is the oldest geographical society in the United States. When it was founded, in 1852, there were but twelve similar societies in the world. Now it exchanges publications with more than four hundred scientific associations. The Society issues a monthly magazine of unusual interest called *The Geographical Review*. It has also a large and growing library—one of the most important geographical libraries of the world; thousands of maps and charts; and a remarkable collection of atlases of the sixteenth, seventeenth, and eighteenth centuries.

Travelers, men of science, and others properly accredited are welcome at the rooms of the Society and may freely use the book and map collections.

Two gold medals have been founded by the Society, the *Cullum Geographical Medal* and the *Charles P. Daly Medal*, which are awarded from time to time to explorers, writers, and men of science who have contributed to the advance of geographical knowledge.

In addition it awards the *David Livingstone Centenary Medal*, founded by the Hispanic Society of America.

The qualifications for Fellowship are an interest in exploration and travel, in the spread of geographical knowledge, and in the advancement of science.

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The annual dues are ten dollars.

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THE GEOGRAPHICAL REVIEW

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THE GEOGRAPHICAL REVIEW

The Geographical Review now succeeds the *Bulletin of the American Geographical Society* as the Society's monthly magazine. The old title—maintained since 1852—did not adequately express the broad field of geographical observation and comment covered by the *Bulletin* in later years. Moreover, it is the intention of the Society to improve its publication still further, to broaden the range and deepen the intellectual interest of its articles, and to give its notes and reviews a more critical and scholarly quality. The breadth of its interest should make *The Geographical Review* the medium of expression both of the scientific geographers of this country and of that growing number of public men and women interested in the diversified fields of exploration and discovery, travel, commerce, and human development.

The Geographical Review hopes to serve the cause of education. Because the physical forces of the earth are so intimately bound up with human affairs geographical science should have a prominent place in our educational system. For many years university and college geographers have found the *Bulletin* a reservoir of useful material. Probably not more than two or three foreign publications of the highest rank have proved equally useful to scientific men in this field.

To become still more useful to education the Society's staff has been organized for the systematic development of the best geographical material from all parts of the world. Over six hundred periodicals, either primarily geographical or containing material of geographical interest, are received each month. These are now thoroughly worked over and the results published in classified form. Probably no other geographical

society carries on work of equal thoroughness and range at the present time.

In practically each issue of *The Geographical Review* we shall publish a notable map, as often as possible in color. During the past half year we have produced a few maps of this order, and an additional number of sketch maps in black and white, which have brought us frequent and favorable comment from journalists, historians, anthropologists, and public men in many sections of the world.

Through the long-continued support of the patrons of the Society we now possess the largest and most valuable collection of geographical books and maps in the western hemisphere. In time we hope to have the largest and best in the world. Through the medium of strong papers, and critical notes and reviews we wish to make these collections dynamic. It is the essence of the modern idea that knowledge is of value only when transformed into action that tends to realize the aspirations of humanity. It is precisely this view that the Society has always taken. We wish to turn even more effectively than in the past to the world outside our walls.

Our traditions point the way. We have the advantage of historical association with a large number of great names. On our roll of honor are Scott, Peary, Amundsen, Shackleton, Nansen, Sir John Murray, and the Duke of the Abruzzi. Among our fellows and honorary and corresponding members we have been proud to count Bayard Taylor, Du Chaillu, Vivien de Saint-Martin, the explorer Chandless, William H. Seward, Sir Roderick Murchison, General John C. Fremont. Among our past presidents have been George Bancroft, Henry Grinnell, and Judge Charles P. Daly. Any organization which has had associated with it so large a number of men distinguished in public life must have peculiarly high and enduring qualities. These men represent an investment of spirit, of ideals, of faith in human service, immeasurably superior to the material investment represented by our beautiful building and grounds and our great collection of maps and books. Without such traditions we should not have reached our present position of influence. In the development of *The Geographical Review* we shall therefore hold steadfastly to our founders' aims to enrich the intellectual life of our time and to serve its idealistic purposes no less than its practical ends.

THE OAK TREE AND MAN'S ENVIRONMENT

By J. RUSSELL SMITH, Ph.D.
University of Pennsylvania

We are beginning to develop a new mental attitude toward the universe, toward our environment. This is the attitude of scientific testing and scientific utilization—a question of great importance to the economic geographer, who is primarily interested in the study of lands as the home of man. In the weighing of lands to determine their value to man, the geographer has had to change his scales every time science has put into his hands a new set of weights. This has happened frequently, and with the advance of science it is likely to keep on happening with increasing frequency. Since coal has entered into use, great shifts of industry, population, and power have resulted. Coal has entered into our thinking, and we have made an entirely new appraisal of the countries of the world. Water-power is now causing another revaluation of lands.

Cement affords an excellent example of the method by which new environmental factors enter into our lives. The discovery of the art of reinforcing concrete with steel opened up suggestive but undefined possibilities. What were these possibilities? Thousands of tests in many laboratories helped to give the answer on its technical side. The new works of the civil engineers gave the answer on the structural side, while geologists and mineralogists scoured the world to locate the materials for the making of cement.

The comfort of man has been increased, and little-used districts have quickly become populous through the sudden fervor of our investigation and adoption of cement after the discovery of the art of making reinforced concrete had, within a decade, made it an effective part of the environment. Perhaps this is to be our method. It should be. For every discovery, as in the case of cement, we should have the means at hand to search the earth and experimentally test out all promising leads.

Thus may man's life become adjusted to his environment, and thus may his activities conserve and improve it. The consistent adoption of such a philosophic attitude toward the earth will present a strong contrast to our past. In the past we have utilized our environment in the most haphazard way, and as to the concept of the whole environment as an influence, why, the race seems never to have thought of it.

What is our environment? Without attempting to define it fully, I will venture the somewhat definitive statement that, for man as an animal inhabiting the earth, those environments are good which permit the winning of a sufficient supply of nourishing food and at the same time permit the maintenance of health and energy.

Man knows far less about his relations to his environment as an *animal* than he does about his relation to his environment as a maker and user of cement. I am glad to note that there are signs among geographers of increasing interest in the study of the environment as it affects man. Those concerned for the welfare of the race should hope that our mass of working knowledge may be increased by the concept that the environment is something to be reckoned with, as is the transportation service or the supply of moving-picture shows. Thus far man has thrown himself about the earth's surface most blindly, more blindly by far than the migrating wild geese. In the main the geese know (environmentally) where they are going. They go into lands that are good for geese and other lands they leave alone. It is peculiar how the young gosling has been so much better taught than the young man. Man has repeatedly and continually gone into environments that destroy life through disease or diminish culture through the destruction of energy. Man is still doing it with all the reckless abandon of the age of the conquistadors. The average high-school or college graduate in the United States today has a strangely uniform concept of the earth. He comes into the professor's office and talks of seeking his fortune in South America as though the Spanish language were the only difference between that much-praised continent and Wisconsin or Pennsylvania. Such happenings are an impeachment alike of science, for neglecting the study of environment, and of education, for neglecting to teach youth some of the important environmental facts that appear to be firmly fixed in the minds of the young of the wild goose. I rejoice that investigation of the environment as such has begun. May it speedily increase until man knows as much about regions as a home for the race as he now knows about them as homes for cement factories. This knowledge may help man to take as good care of himself then as he now does of a cement factory.

Along with use of the earth comes inevitably the idea of conserving the earth and its resources. The two ideas should be inseparable, and it is one of the tasks of civilization to make them so. We may use and destroy as the savage and the civilized alike have so often done, thus keeping alive the saying "after man the desert"; or we may use the earth and leave it almost unimpaired, in some respects even much improved by our tenancy. This idea of scientific utilization of our environment will claim much more of our attention if we look forward to a long sojourn of a numerous race of men upon this planet. Here again we have shown ourselves much the inferiors, cosmically speaking, of our planetary brethren, the geese. We have destroyed. They have not. The aim of the so-called conservation movement is that the group shall compel the individual to cease destroying the environment. This movement has great reason for being, but it has not yet gone very far. Except for some tree planting, the conservation idea has, up to the present, produced little but a string of thou-shalt-nots, and

FIG. 1—Cork bark stripper at work. The unstripped portions of the bark may be seen on both branches above the level of the man's head.

FIG. 2—Young cork-oak tree raising a second layer of cork. Branching limbs of the desired shape. The four limbs will produce more cork than the one trunk.

the would-be conservators have not had enough faith in this process of negation to mention it in connection with the greatest and most menacing of all resource wastes—soil erosion. This is the irreparable destruction, man's greatest crime against his environment. Most of the minerals can be substituted, and, as long as soil remains, the forests and fields can be restored, but where soil erosion does its deadly work, the possibility of forest production, and yet worse, the possibility of food production, is reduced or destroyed for an indefinite and often very long period—a geologic epoch, perhaps. Without a food supply an environment ceases to support man, despite the most wholesome and invigorating climate. The climate is then wasted. It is a fact rarely appreciated that some of the worst soil destruction now going on in the world is taking place in climates of high excellence right here in the United States. It is also probably true that this soil destruction is going on faster and also over larger areas than ever before in the world's history.[1]

As a means of getting more food and useful commodities out of the earth, with greater ease and with conservation of the soil, I here call attention to the idea of a new agriculture, a tree-crop agriculture, which seems to hold the promise of easily doubling our productive area and making revolutions in man's relation to his environment second only, perhaps, to the influence of steam. These new utilities arise from discoveries in economic botany which are hinted in the four words, *variation, heredity, propagation, culture.* If fruit and nut trees not yet recognized as crops in the United States equaled cement in the amount of study, exploration, and experiment bestowed upon them, tens of thousands of people would recognize at once that we have at our disposal a new means of utilizing the environment which would conserve it and at the same time double its capacity for supporting man, perhaps even with a diminution of effort.

In attempting to present the possibilities of such a new agriculture, such a new connection with the environment, I submit some data concerning the oak tree as a producer of crops other than wood.

I choose the oak deliberately because it seems to most people a peculiarly hopeless basis for an agricultural crop. We think of it as symbolizing strength, sturdiness, and the impossibly slow beginnings from that little acorn. This I believe is largely due to a concept that the poets have wrought into us. The oak trees should sue the poets for damages to a reputation that should otherwise be good.

The oak tree, without sacrificing a pound of wood, gives rise to one of the chief exports and two of the important industries of Portugal. If I wanted to be comfortably and permanently rich, I could ask for few more secure bases for it in the line of agricultural lands than the undisturbed possession of a few hundred acres of Portuguese land with a good stand

[1] J. Russell Smith: Soil Erosion and Its Remedy by Terracing and Tree Planting, *Science*, Vol. 39, 1914, June 12, pp. 858-862.

of cork-oak trees (*Quercus suber*) and evergreen-oak trees (*Quercus ilex*). If the stand of trees was good, it would make little difference if the land happened to be rough, untillable hillsides. It would still yield its crops of cork and pork—the pork made of acorns. The virtues of the Portuguese cork forests are quadruple, and they are almost perpetual.

With reasonable care, which consists of occasional cuttings-out of an undergrowth of bushes inedible to the goat, and occasional thinnings, the forest will live for centuries and yield four kinds of income. The trees yield best of both cork and acorns when the stand is not thick enough for the trees to crowd each other. This permits some growth of forage for sheep and goats. It is the common expectation that the income from this source in a proper oak forest will pay for the labor of grubbing bushes, which, aside from fire protection, is the only maintenance charge. That leaves the other three sources of income, wood, cork, and pork, to offset interest and taxes and make profit. The landlord's task is easy, as the pasture is rented by the tract, the cork is sold to contractors by the ton, the wood by the cubic meter, and the hog pasture on some lump arrangement.

Every nine or ten years the cork bark is stripped. An acre with a full stand of young trees will have seventy trees yielding fifteen kilograms per tree, or 2,300 pounds per acre. As the trees get older and are thinned out to prevent crowding, the increased yield per tree keeps the cork output up to the average which, with care, can be maintained at over a ton per acre indefinitely. Cork is now worth about seventy-five dollars per ton. When the trees come down, they make the precious charcoal by which the Portuguese nation shivers in winter while it cooks its simple meals. In the properly cared-for forest every old cork tree has beneath its branches several half-starved understudies leading a submerged life until it comes their turn to have space in which to spread. I have seen a large cork tree, fifteen feet in girth and with a reach of fifty-six feet, that had yielded 1,980 pounds of weighed cork at a stripping.[2] An acre will easily hold eleven such trees, and I am told by competent authority that there are many such acres in Portugal. It is an interesting and peculiar fact that the poorer the land the better the cork. This results from a finer texture due to slower growth and causes some fine cork forests to be on sandy or stony land, which in any other country would be called "barrens" and would find its highest productivity by growing a pine forest. In some districts the trees are made the sole basis of estimating the value of the land on which they stand. Near Evora, in south-central Portugal, the method of calculating the value of a cork forest is as follows. The twenty-year yield of cork (two strippings) is taken as the basis. The buyer pays 600 to 650 reis (1,000 reis=$1.08) per *arroba* (33 pounds) of cork capacity. Thus a good acre of cork trees would bring $125 or more, and the seller throws in the land.

[2] Figures from a careful English owner with an engineer's training.

In America every teacher of economic geography is hammering into the heads of his students the relationship between the corn belt and meat production. If such a teacher should by any revolution in education get into Portugal, he would be emphasizing the relationship between cork and pork. English owners of cork estates in Portugal estimate that acorns alone produce from half to two-thirds of the total pork crop of that country. The Portuguese hog leads a lean and hungry life for a year and a half or two years, and then comes an orgy during which he eats acorns all day and sleeps on them at night. In three months he doubles or triples his weight and passes on to the ceremonies at the abattoir.

As the acorn crop is not under much control of man and does not come regularly, it is difficult to make an exact approximation of pigs and acorns. This difficulty is met by the organization of fortnightly markets in the villages of the cork regions where pigs in any and all stages of fatness and leanness are bought and sold at any and all times. Two weeks before the pig is completely fatted, he may be sold by the man who has a shortage of acorns to the man who has a surplus. Careful experiment in central Portugal has shown that 5.3 liters of acorns will make one pound of pork. By means of this Rosetta stone we can get some idea of the acorn yield, which in years of full crop is surprisingly heavy. In estimating the number of pigs to buy, the farmer walks through his forest scanning the trees and the acorns on the ground, and every time he sees the fattening for one more pig, he puts an acorn in his pocket. Such a man, a manager of an English-owned estate, has told me that big cork trees will yield 100, 200, 300, and even 400 kilograms of acorns, but not 500 kilograms.

On the unfenced acres of a cork estate two kinds of herders are daily abroad: the swineherd, whose wards eat grass and acorns, and the shepherd, whose sheep and goats browse the bushes and grass and furnish wool and milk, the fifth and sixth products of the cork forest.

As I rode through one of these estates on an April day, I came upon a long lane full of sheep, seven hundred of them, crowded solidly between close fences and two shepherds busy at their regular afternoon job of milking them. They started at one end of the long and motley mass and worked their way through it. One presided over the milk bucket, the other caught the ewes, backed them up to the bucket, and held them for the milker to extract a few spoonfuls of rich milk, after which the poor beasts were pushed aside to join the growing mass of the recently milked. That evening at the house of João Dias, estate foreman, I had for supper rich cheese of sheep's milk, but my appetite for it was not increased by the memory of the first process of its making.

The evergreen-oak (*Quercus ilex*) has bark of no value, but is a greater yielder of acorns than is the cork-oak, so that no Portuguese will cut down the one tree for the other, so absolutely are they valued alike. Often the two species are mixed indiscriminately in the same tract, but in some

FIG. 3.

FIG. 4.

FIG. 3—Cork tree with a weight record of 1,980 pounds of cork at one stripping.

FIG. 4—Piles of crude cork awaiting shipment at railroad station, central Portugal. Cork trees in the background.

FIG. 5.

FIG 6.

FIG. 5—Large ilex tree in southern Portugal with an average acorn yield of 720 liters and a maximum of 1,200 liters.

FIG. 6—A Majorca farm. Cultivated fields in the valleys; ilex forest on the limestone hill beyond, highly valued as a hog-fattening range. Note the rounded heads of the trees, showing that they have been thinned out to permit full individual development.

localities the ilex forests are almost pure stand and are cared for exactly as are the cork forests. In other localities the young trees are allowed to grow where they spring up by chance in the fields, and the ordinary cultivation of wheat and beans, barley and hay, goes on just the same. This gives a beautiful parklike landscape; the cultivation helps the oaks to make acorns; and after the grain crops are harvested, the hogs are turned in to gather the mast crop.

Reliable records of measured yield of anything are hard to secure in such a land of hit-or-miss as Portugal, where the average farmer does not know even the size of his farm. He often buys it or rents it by the unmeasured piece, as we do horses. The difficulty of getting records of yields of oak trees is further increased by the practice of letting the animals do the harvesting. But down in Algarve, the southernmost province of Portugal, I heard of an ilex that bore 1,200 liters of acorns. The definiteness was pleasing to the ear of one in search of facts, and the size of the yield was surprising. I went to see the tree, which had a reach of only fifty-one feet. By long and devious methods I cross-questioned the owner, a widow of sixty, more or less, but she always struck to it that the tree bore 1,200 liters on full years and 240 liters in the alternate years, and that the average was 720 liters per year. She said she knew, because she picked them up and sold them in the village. Selling acorns is a common but not extensive practice in many parts of Spain and Portugal, and this woman's tree stood alone in an unfenced outer yard at the edge of the village of St. Bras, so that it was not convenient to let pigs do the work of harvesting. Everybody around believed the woman's statements, a process which is made easier for us in this country by the statement in the September, 1915, number of the *Journal of Heredity* that a certain valley oak tree in California bears a ton of acorns as a full crop. (The average yield of corn per acre in the United States is about 1,400 pounds, or 800 quarts.)

On the slopes of the Sierra Nevada in Spain, a few miles south of Granada, I saw the ilex rendering its supreme service—holding the earth for man and at the same time giving him a living. In this locality the formation was unconsolidated clay and gravels of such depth that no bed rock was anywhere in sight. The slopes and height were such that the name mountain would be applied perhaps even by the Swiss. On one of these slopes I examined an ilex orchard that was giving a fair return as part of a farm. A part of this orchard was so steep as to be very difficult of ascent. When the tenant told me he let his hogs run there, I asked him how he kept them from falling out into the stream below. "Oh," he said, "I don't let the big fat ones come here. I'm afraid they would fall. I only bring the little ones into this part." A mile away, on a less steep part of the same slope, men for centuries had been supporting themselves by the agriculture of the plow, and nature had shown her resentment of this act of violence. In some places from half to three-fourths of the original

land surface was gone, through the work of gullies that were from fifty to two hundred feet deep. "After man the desert" was here literally being put into effect. The ilex slope was much the more productive of the two, and it had been saved by being so steep that it could tempt no plowman.

In Corsica, where a very systematic and effective tree-crop agriculture has been worked out with the productive grafted chestnut tree as the main dependence, the ilex is a secondary crop of no mean importance, although, for some unaccountable reason, the people have not improved it by grafting as they have done in the case of the chestnut. This oak will grow at greater altitudes than the chestnut, and it spreads out in a far-reaching zone on the higher slopes above the chestnut forests. Here, as in Iberia, acorns are used for fattening swine and goats.

It is in the Balearic isle of Majorca that we see indications of the highest possibility of the acorn, namely, its service as food for civilized man. The acorn analyzes well, being nearly as nutritious as maize, except for a part of the protein content. This highly starchy nut—for it is a nut—is mostly too bitter to be relished as human food, because there is a certain amount of tannin present, but, owing to the ever-present variations of individual trees, there are some ilexes that bear acorns as much prized for human food as are chestnuts. Twigs from some of these choice trees have, for a century or two, been grafted upon the common kinds in a few localities of Majorca and the Spanish mainland, and the fruit is sold in competition with and at the same price as the chestnut. Why has this not become an extensive industry? That question can only be answered by asking others. Why have not the people of the United States copied the Corsicans, French, and Italians in developing orchards of improved chestnuts on our own steep and rocky slopes where the wild chestnut tree has been ready for grafting ever since the first settlers landed?

The acorn, despite its bitter flavor, has served and yet serves as an important food supply for many isolated primitive peoples, especially in years of poor harvest of their tilled crops. Examples of this are found among the Berbers of the Atlas and the Indians of Nevada and California. Ethnologists could doubtless multiply examples by the score, and it has almost certainly been one of the important foods of primitive and prehistoric man in the oak-growing regions which nearly encircle the earth in the north temperate zone. The low protein content of the acorn makes it an admirable food to balance the meaty ration of a hunting tribe. Mr. George B. Sudworth, dendrologist of the U. S. Forest Service, reports that an Indian tribe in Nevada makes an annual autumn excursion over the Sierra into California. There they busy themselves in the national forests gathering acorns and carrying them out to the trails in sacks. Thence they are packed or hauled over the mountains to the tribal home, and the bread supply for a year is secure. It is a part of the squaws' regular

FIG. 7—Effect of soil erosion in the border region of the Sierra Nevada near Granada, Spain. The ridge in the background has been ruined by erosion, which has cut gullies 200 feet deep: the smooth level tops are all that remain of what was originally an agricultural surface. The slopes in the middle ground and foreground, being too steep for the plow, were saved from a similar fate. Planted with ilex trees, whose acorns form the chief fodder for swine, they are much the more productive of the two areas.

FIG. 8—Hillside of limestone in Majorca. Ilex trees wedging themselves into the crevices of the rock and yielding a crop.

routine daily to pound up a portion of acorn meat and soak it in water that the tannin may be dissolved and the bitter meal made sweet. The coarse, wet farinaceous mass that remains is the oatmeal, shredded wheat biscuit, corn meal mush, pone, or wheat flour for the tribe. I should be much interested to know what a good industrial chemist could do with that liquor containing the tannin extract, for tannin is scarce. And I have great faith that in this day of blended foods the Bureau of Chemistry at Washington might, with some mixture of grains, sugars, and starches, produce an excellent food like shredded wheat or crackers which could have acorns as its base, be made in a factory, and keep for weeks or months.

In speaking of the possibility of the acorn as human food, I wish to emphasize the fact that I am pointing out possibilities only. Man likes to eat what he likes, and he is very conservative about making changes. Serious consideration of the acorn as an American crop should be along the lines of its real importance in Europe—forage. Our rising price of meat indicates a shortage of forage, a shortage which promises to grow keener as population increases faster than fields. It is rarely appreciated that something like nine-tenths of the produce of American agriculture goes to feed our animals. There is the constant menace of over-production in many of the crops that man himself eats directly, but for forage, for animal food, which may give us cheaper meat, more leather and wool, there is almost indefinite room for expansion.

Even America is not without suggestive beginnings in the use of the oak tree. The U. S. Forest Service annually admits two hundred thousand or more swine to the national forests for a consideration. The acorn is one of the chief reasons why the owners of these animals pay for their admission to the forests. This practice is almost the exact duplicate of the way it is done in Spain and Portugal. I have found a farmer in the coastal plain of Georgia who thinks that his plantings of the water-oak are making more hog food with its acorns than corn would yield on the same poor sandy soil. I have found another experimenter on the clay hills of the Georgia highlands who thinks the chestnut-oak one of the most promising forage plants for large areas of Appalachia. At Hubert, Minnesota, Colonel Freeman Thorpe, a private investigator with faith in trees, has become convinced by his experiments that the Minnesota black-oak can be made to yield a hundred bushels of acorns per year on soil that will not make one-third that much corn.

This accumulation of experience of the Old World and the New World seems to show beyond peradventure that the oak genus with its many fruitful species is worthy of careful investigation by agricultural science. The case seems almost analogous to the first discovery of reinforcing in concrete and its relation to engineering science.

What is agricultural science to do with the oak tree? Four things may

FIG. 9.

FIG. 10.

FIG. 11.

FIG. 12.

FIG. 9—Young ilex tree, central Portugal, in full bloom. Peasant by it declared it bore "about two hundred acorns the preceding season."

FIG. 10—Young grafted ilex tree in Majorca, Balearic Islands.

FIG. 11—Chestnut-oak trees grown from shoots around stump of trees that had been cut seven years previously on the Blue Ridge in northern Virginia. Both trees are bearing acorns.

FIG. 12.—Turkey-oak photographed thirty months after desolation by forest fire on the quartz sandstone soil on top of the Blue Ridge in northern Virginia. The boards in the background are five inches wide.

be done: (1) find the best wild parent trees; (2) propagate them; (3) breed better types; (4) propagate these better types.

The fact of individual variation of specimens has given us the Baldwin apple and the sour roadside crab, both of which are of the same species as recognized by botanists. The first Baldwin apple-tree was a Napoleon among trees which happened to be caught and propagated by the million.

This variation of individuals extends also to the question of precocity, a respect in which the oak trees as a class suffer unjustly in men's minds, as was mentioned above. In Portugal, Spain, Algeria, and Tunis, I have seen hundreds of ilexes not as high as my head, in full bloom. I have been repeatedly assured that they bear profusely at such small sizes and at an age not exceeding that at which the apple commonly begins to bear. But we have more remarkable oak trees in the United States. The crests of many Appalachian ridges are made by a stratum of Cambrian sandstone or quartzite in which grains of sand, held together by a silicious binder, break up slowly into a sandy soil of most pronounced sterility. Where its physical conditions would permit agriculture man shuns this soil as he would the Sahara. Yet several species of dwarf oaks grow in this forbidding ground. One of them is reported by Dr. Charles S. Sargent to lie over on the ground, so great is the burden of its acorn crop. In the Maryland, Virginia, and West Virginia section there is a low-growing species, having fruit within two feet of the ground, called the turkey-oak for obvious reasons. On one particular stretch of the above-described quartzite soil that has come under my observation, there has been a forest fire every two or three years for the last forty years at least. In April, 1910, I saw one of these fires, which burned everything to the ground. Thirty months later the turkey oaks were thirty inches high and full of fruit. Such quick and continued fruitfulness from such sterility seems little short of miraculous and certainly shows a combination of qualities that man should make efforts to put to economic use. Chestnut-oaks growing on another soil type a half mile distant from the above-mentioned turkey-oaks have produced seed the seventh summer after the shoots sprang up from stumps left by the lumbermen. In the case of these chestnut- and turkey-oaks there was no especial search made for extra specimens. They merely grew by the roadside along which I had to pass. Hybridizing of these species to get the best blend or mixture of their qualities offers an enticing field to the experimenter.

The breeding of plants for definite ends has just begun. It offers great and as yet little-appreciated possibilities. There is small reason to doubt that breeding experiments in the oak genus will permit the essential duplication of the results obtained by Dr. Walter Van Fleet of the U. S. Department of Agriculture with the chestnut. This tree often bears only at an advanced age, but by taking advantage of the precocity of rare individuals

Dr. Van Fleet was able to produce specimens so precocious that they bore eighteen months after the seed was planted.

The producing of better strains by crossing and hybridizing is usually a slow and somewhat difficult scientific process. In any case it should follow a careful search of existing trees so that it may start with the best raw materials. In the meantime many of these naturally produced trees are well worth propagation if they can just be sought out. Let us hope that the economic botanists and the agricultural scientists will soon be able to address themselves to this task.

The oak with its many species, one or more of which cover nearly all sections of the United States, is merely a type. In some sections there are several trees which may by selection, propagation, and hybridization become the vehicles of crops, the basis of a new agriculture.

In the past, agriculture has depended on the plow. If land was not arable, it was not fit for agriculture. The experience of many Mediterranean localities and the evident possibilities of tree crops show that we have at hand the materials for a new tree-crop agriculture that may more than double the productive area of many hilly, stony, and mountainous districts. Such a development promises to bring new and interesting influences to bear upon the wood supply, soil erosion, stream control, and the water supply, all of which are major problems in man's utilization of the environment.

FAULT COASTS IN NEW ZEALAND

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Introduction

The scientific study of scenery has engaged the interest of geographers ever since the time that explanation began to supplement mere description. There is an infinite variety of landscapes, and among them are types that make their sentimental or intellectual appeal to this class or to that. The stern shores of the fiorded Alaskan coast and the bitter walls of rock that meet the Atlantic in western Scotland are a challenge to the imagination of even primitive men. To the philosophic student of modern times they appeal to the investigating sense no less than to the emotions. The finer shades of appreciation find an ample field in the delicate beauty of terraced coasts or the tree-fringed islets of tropical seas. Yet here, as on the bolder coasts of the world, man's sense of how and why is stirred to action. Thus there has arisen a phase of physiography that deals with the shore, with its multiplicity of forces, and its infinite and inspiring detail.

The topography of continental interiors represents chiefly the reaction between air and water on the one hand and the crust of the earth on the other. The topography of the shore is vastly more complex. A third agent, the sea, plays its varied rôle upon a surface already complicated by subaërial agents. When to this diversifying agent there is added crustal fracturing of unlike kind in unlike amounts, and all the irregularities of form produced by crustal warping, the result is likely to be a problem of the first rank. Moreover, the shore-line runs its cycle of change in obedience to laws and at a rate wholly unlike those that affect the interior of the land. At any stage in the normal cycle of the land the sea-shore may have reached a wholly different stage in its development. In the inharmonious relations of these forces lie half the physiographic problems of the coast.

To put into an orderly scheme so complex a set of agents and forms as the coast lines of the earth display, the great masters, Suess and Richthofen, each attempted to classify the various coastal forms by groups, and each believed that he recognized a group in which crustal fractures determined the position of the shore-lines. Thus we have the "Atlantic" coasts of Suess and the *Beckenrandküsten* of Richthofen. Suess defines the Atlantic type as follows: "The inner sides of folded ranges, jagged rias coasts which indicate the subsidence of mountain chains, fractured margins of horsts,

and fractured table-land form the diversified boundary of the Atlantic Ocean."[1] Richthofen's *Beckenrandküsten* are formed by the walls of basins due to foundering on the inner side of mountain ranges. It is interesting to note that Richthofen regarded the east coast of New Zealand as of this type and considered it exceptional in that it faced the open ocean.[2]

These classifications of coast type are based upon the broad structural features of the adjacent lands. In framing them their authors, particularly Suess, paid little attention to the actual features of shore-lines, to the topographic forms of coastal lands, or to the configuration of neighboring sea floors, any or all of which may throw light on the origin of a coast.

In a recent European classification of coasts, that of De Martonne, we find *côtes des régions d'effondrement* with initial forms determined entirely by fractures. As examples are cited the coasts of Greece, southern Italy, and Japan.[3]

Turning next, however, to the writings of geomorphologists of the American school, we find that fault coasts are not recognized by them. Gulliver[4], for example, has distinguished as initial forms of shore-lines those resulting from "uniform uplift," "uniform depression," and "diverse movements," and among the last he has mentioned "crumpling and faulting"; but, in the study of sequential forms, he has not recognized any features as characteristic of shore-lines the initial forms of which were fault scarps. The omission was, no doubt, due to the circumstance that, in the material available for study, coasts that had previously been regarded as fault coasts, e. g., some of the Atlantic coasts of Suess, found a more acceptable explanation as sequential forms developed from initially depressed, uplifted, warped, or tilted coasts.

The writer therefore deems it advisable to sketch briefly a scheme of forms which fault coasts may be expected to exhibit, before setting out his reasons for believing that certain of the coasts of New Zealand are of this kind. A complete scheme would be too long for presentation, and so only such portions of a complete scheme will be given as seem applicable to those coasts which the writer has had the opportunity of examining.

The Fault-Coast Hypothesis

INITIAL FORMS

The essential feature of a fault coast is a fault scarp separating a higher-standing earth-block, which, after faulting, forms the land, from a

[1] E. Suess: The Face of the Earth (Engl. transl.), Vol. 2, Oxford, 1906, p. 203.

[2] F. von Richthofen: Führer für Forschungsreisende, Hanover, 1886, p. 300.

[3] E. de Martonne: Traité de Géographie physique, 2d edit., Paris, 1913, p. 712.

[4] F. P. Gulliver: Shoreline Topography, *Proc. Amer. Acad. Arts and Sci.*, Vol. 34, 1899, pp. 151-258.

lower-lying block, which, after faulting, is depressed below sea-level. The pre-faulting surface may have any form. It may be a level sea-floor, or it may be a land surface with low, moderate, or strong relief. The vertical displacement on the fault may be small or great if the pre-faulting surface has low relief, but, if the pre-faulting surface has strong relief, a continuous fault coast can be formed only by a vertical movement of hundreds, perhaps thousands, of feet; that is to say, the movement must be sufficient to submerge the ridges of the down-thrown block. Incomplete submergence would result in the formation of outlying islands, peninsulas, and promontories, as partially drowned ridges would project seaward from the fault line (Fig. 1).

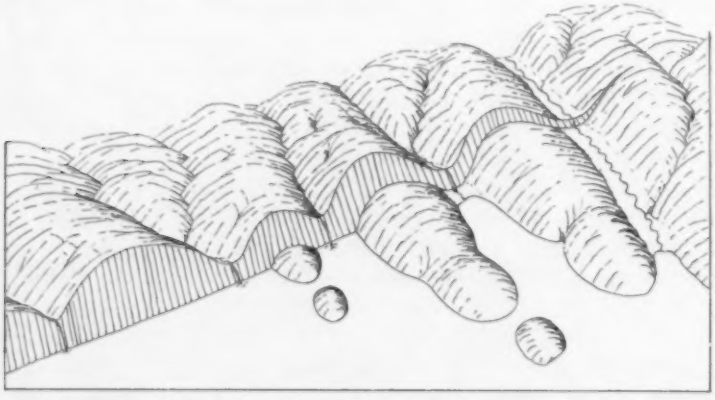

FIG. 1—A fault coast (on the left) formed by a fault scarp diminishing in height towards the right, where islands and promontories make their appearance seaward of the scarp and the fault dies out inland.

The movement of the earth-block is relative movement, and so various cases arise, according as the landward block has been uplifted, has remained stationary, or, if the region was formerly above sea-level, has subsided with, though to a smaller extent than, the seaward block. It is thus possible to imagine many variants of the initial form. A transition may be traced, for example, from a normal fault coast through a case in which the pre-faulting surface has no relief, with diminishing and finally vanishing displacement on the fault, to a normal uplifted coast (Fig. 2).

A transition in the other direction may be traced through a case in which the pre-faulting surface is an accidented land surface, with increasing depression of the landward block, to a normal depressed coast (Fig. 3).

In order to simplify this discussion, attention may be directed principally to those cases in which the pre-faulting surface is a land surface of moderate to strong relief, in which the seaward block is completely submerged, and in which the displacement on the fault is considerable. Imagined initial fault coasts, thus limited, fall into two groups. The first

includes those during the formation of which the landward block rises or remains stationary (Fig. 4, block *A*). In either of these cases the shore will be formed by a continuous fault scarp differing from the initial form of a fault scarp on a land surface in no respect except that the base of the

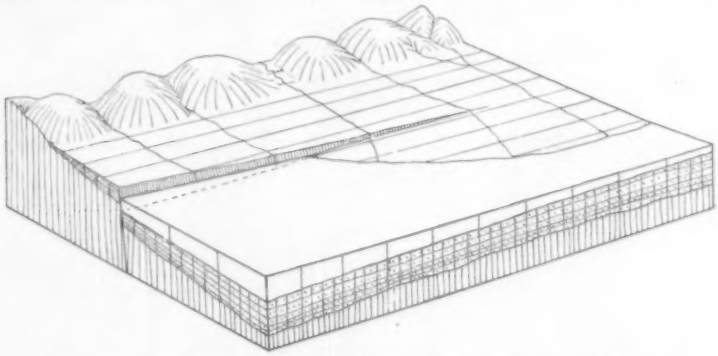

FIG. 2—A fault coast, on the left, formed by a fault scarp diminishing in height and dying out towards the right, where the coast passes into a normal uplifted coast.

visible portion will be the horizontal sea-margin. All along the coast betrunked streams will cascade into the sea from the mouths of hanging valleys. Fault coasts of a second kind may be formed if a movement of subsidence in the landward block accompanies faulting (Fig. 4, block *B*).

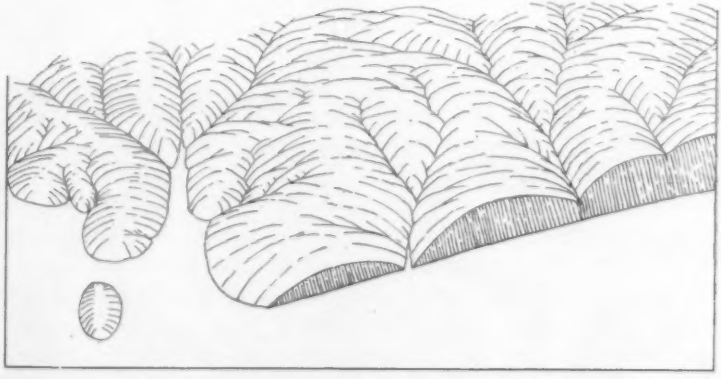

FIG. 3—On the right a fault coast, which, owing to downward tilting of the landward block toward the left, passes into a normal depressed coast on the left.

If the subsidence is sufficiently great, the deeper valleys of the pre-faulting surface will be drowned and the initial shore-line will therefore be less simple than in the preceding case, as there will be a few reëntrants breaking the simple line of the fault coast. In order to simplify the discussion as

far as possible, it is assumed that the seaward block sinks to such a depth that the underwater portion of the fault scarp forming the initial coast descends everywhere into deep water (to a depth of 600 feet or more). Seaward, the sea-floor will have, initially, the relief of the submerged land surface, while, close inshore, the initial floor will slope steeply seaward, being formed by the fault scarp itself if the fault hades seaward at a considerable angle, or, if the fault is nearly vertical or overhangs, by a talus of waste that has broken away from the crest of the landward block while the faulting movement was in progress. (For convenience it is assumed that the work of erosion is not begun until the earth movements

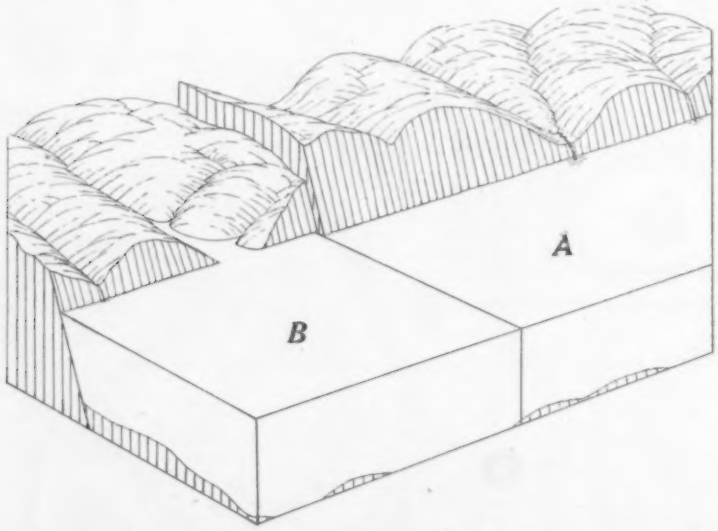

FIG. 4 - Two initial fault coasts. In block *A* the landward block has risen or has remained stationary, while in block *B* it is slightly depressed. The seaward block is depressed to the same extent in *A* and *B*.

that produce the initial form are at an end. In nature erosion is never thus delayed, but the writer believes that the sequential forms of fault coasts may be most satisfactorily deduced with this assumption and that the errors resulting from it are very slight.)

SEQUENTIAL FORMS WITH STATIONARY SEA-LEVEL

The Landward Block: Rejuvenation. In the case under consideration, where the pre-faulting surface is a land surface, it is to be expected that some of the valleys transected by the fault will drain inland and others seaward. The streams which flow seaward across the newly formed fault scarp, and at first cascade from hanging valleys, will begin at once to cut

notches at their mouths. The larger of these streams will rapidly develop new, young valleys—steep-sided ravines at first—within the more mature valleys of the pre-faulting surface. Naturally the contrast of the post-faulting with the pre-faulting features will be most marked, and the merging of the former with the latter will be longest delayed when the pre-faulting surface is well advanced in the cycle of erosion and reduced to moderate or low relief. The heads of the young ravines of the revived streams will advance headward up the older valleys, and so, early in the history of the fault coast, the region will be characterized by composite topography. At the mouths of the minor seaward-sloping hanging valleys, however, notch-cutting will be slow, on account of the feebleness of the streams, and so the valleys of many small streams will long remain hanging.

In the case of transected valleys the slope of which is towards the landward block there will be, obviously, no tendency towards deepening by stream action, any deepening that was formerly in progress having been brought to an end when the streams lost their headwaters, that is to say, when they were beheaded by faulting. Such streams will now be misfits—too small for their valleys. Not possessing the power of rapid down-cutting, they, as rejuvenation of the topography progresses, will be liable to be captured by the vigorous tributaries of those revived streams, previously mentioned, which now flow down steep gradients to the sea in their newly deepened valleys. Thus it may happen that, if a coast has been formed by faulting and sufficient time has since elapsed to allow of adjustment of streams to the new conditions, some rivers will rise near the sea, flow inland for some distance and then, after turning sharply around to right or left, flow to the sea along courses more or less parallel with their headwaters. Somewhat similar conditions would result from the rapid consumption of a land area by marine erosion, but, since such rapid consumption of the land can take place only as an accompaniment of subsidence[5], in that case the stimulus to capture afforded by the rejuvenation of large neighboring streams would be absent, or, if not quite absent, at least much less effective. The presence of stream courses of this kind may be taken not as definite proof but as presumptive evidence that the land on which they occur is bounded by a fault coast. Their absence, on the other hand, does not disprove faulting, as streams flowing inland on the initial surface of the landward block may be infrequent or altogether absent. This will be the case when a coast has been formed by faulting not far inland from the former coast.

The Landward Block: Result of Depression. The changes in the topography thus far described are of the same nature as those that will take place on the surface of a block mountain in the neighborhood of the fault scarp that separates it from the adjacent lower-lying block, in that

[5] A. C. Ramsay: Physical Geology and Geography of Great Britain, 5th edit., London, 1878, p. 497; F. von Richthofen: Führer für Forschungsreisende, Hanover, 1886, pp. 354-355.

case unsubmerged. It makes no essential difference whether the block mountain has, in the process of faulting, been itself uplifted, has remained stationary, or has been depressed, provided only that it is relatively higher than the adjacent block, for, in all cases, the local base levels for streams on the pre-faulting surface of the mountain block are lowered throughout the length of the fault scarp.

In the case of the land bordering a fault coast, however, this is not so in every case. It has been pointed out above that the initial form of the shoreline with the landward block depressed will show, in some cases, reëntrants formed by the drowning of portions of valleys. At all points along the shores of these reëntrants local base levels are not only not lowered, but are

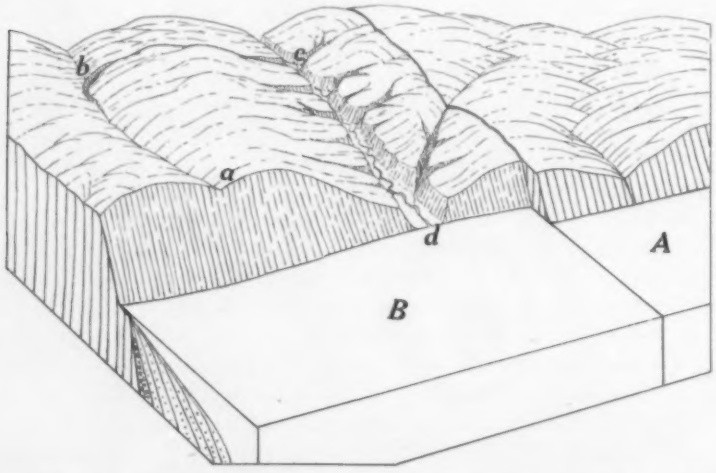

FIG. 5—Early sequential form, block *B*, developed from an initial fault coast, block *A*. In block *B* the inland-flowing stream *ab*, already beheaded by faulting, has been captured by a tributary *bc* of the revived seaward-flowing stream *cd*.

replaced by permanent base level, the shore line within a reëntrant being simply that of a short length of depressed coast.

Along stretches of the coast scarp all the betrunked valleys will be initially hanging, but such will be only those of the smaller seaward-flowing streams, and consequently their lips will be but slowly notched. While valley-in-valley forms will be produced to some slight extent near the sea, general rejuvenation of the topography will not take place as in the case previously considered, and readjustments of stream courses by capture are not to be expected.

The larger valleys, which are drowned at their mouths, will be affected by bay-filling, delta-building, and up-valley aggradation; and those exceptional valleys that have accidentally been cut across by the fault just

at sea-level will be unaffected until caused to degrade by retrogradation of the shore.

With increasing depression of the landward block we have the transition to a normal depressed coast previously referred to (Fig. 3); as the sea advances over the coastal land the fault scarp passes too far seaward to be of any further significance as a coast feature.

Shore Features in Profile. Scarps of the kind considered in this discussion are cut through here and there, at a very early stage in their history, by revived, outward-flowing streams; and, even if such streams are absent, the continuity of any fault scarp must soon be destroyed as a result of the excavation of ravines by new, consequent streams. It has been shown, however, by Davis[6] that, in the case of a fault scarp descending to a land surface, facets, triangular remnants preserving the form of the initial fault scarp, are to be found on spur ends even when dissection of the mountain block is far advanced. Such facets are subject to constant reduction in size as the spurs which they truncate are reduced in width and height by the widening of the valleys on either side, but the flat surface of a facet, though slowly wasted by soil creep, will be subject to little change of form beyond a certain amount of reduction of steepness and loss of sharpness of the edges. While any facets of such a scarp remain they can have retreated but little from the fault line, and they will therefore retain their alignment[7].

In the case of a fault scarp descending to the sea—an initial fault coast—, on the other hand, the scarp is attacked by wave action and will be worn back from the fault line. When the coastal land has been dissected by streams, the intervening spurs will end in facets or cliffs, but these will be true wave-cut cliffs and not remnants of the original scarp. It is true that, in the case we are considering, where the initial scarp descends with a steep slope into deep water, wave action must at first be feeble, as Fenneman[8] has pointed out, on account of the reflection of waves from the steep shore, and also on account of the absence of a resting place for loose material at a convenient depth to allow it to be picked up and made use of by waves in their attack on the face of the cliff. Such material as is dislodged by the impact of waves on the initial shore will slip immediately into deep water. When, however, the scarp, if initially too steep to cause waves to break, has had its steepness reduced by slumping and by slower surface creep, accompanied by accumulation of talus at the base of the slope (Fig. 6, *b* and *b'*), waves will break and, by their impact, will dislodge weathered material and joint-bounded blocks. Thus a nip will be developed (Fig. 6, *c*), slowly at first if there is still a lack of "tools", as in Figure 6, *b*,

[6] W. M. Davis: The Mountain Ranges of the Great Basin, in Geographical Essays, Boston, 1909, pp. 725–772 (first published in *Bull. Mus. Compar. Zool. Harv. Coll.*, Vol. 42, 1903).

[7] *Ibid.*, p. 747.

[8] N. M. Fenneman: On the Lakes of Southeastern Wisconsin, *Wis. Geol. and Nat. Hist. Surv. Bull. 8*, 1902, p. 23.

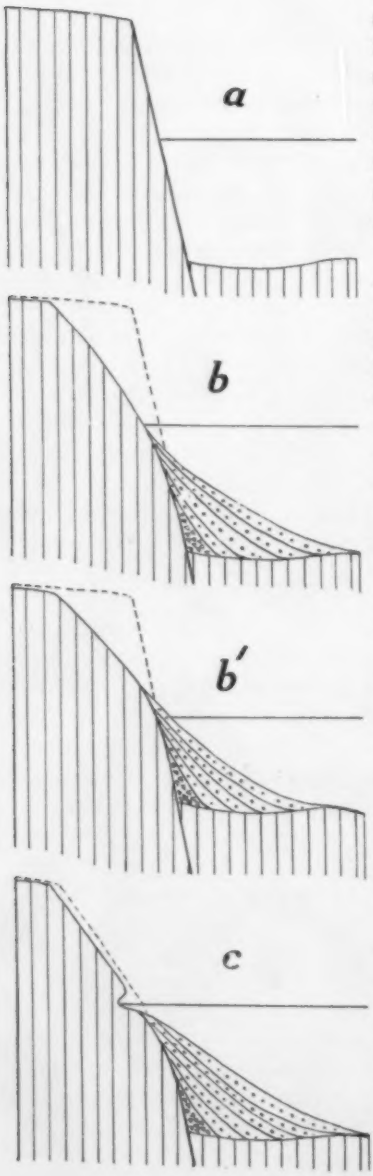

FIG. 6—To illustrate the beginning of wave attack on a steep coast. *a*, initial form; *b*, *b′*, *c*, sequential forms.

with which the waves can exert a truly abrasive action, but more rapidly if, as in Figure 6, *b′*, the material of the talus supplies tools[9]. The action will go on with increasing rapidity as the increasing width of the rock bench allows of the lodgment of coarse waste, insuring a supply of the material which most effectively assists waves to abrade solid rock.

After this stage is reached the conditions will be for a time those which allow wave action to work with maximum efficiency as a destructive agency. Deep water will still be present at a short distance from the shore, and so the waves will reach the rock bench on which they break with their energy unimpaired by friction of the bottom. Most of the finer and much of the coarser products of abrasion, moreover, will be withdrawn immediately from the arena, as they sink or slide to the bottom at a depth below strong wave action, if not quite below wave base. There will thus be no clogging of the shore with waste: bare rock will be exposed nearly continuously over the rock bench and at the base of the newly cut cliff, and this bare surface will be constantly exposed to abrasion during storms by that portion of the coarse waste which remains on it.

At the same time, the initial floor being assumed to be below strong wave action, deposition will go on extremely rapidly near shore, so that, very early in the history of the fault coast, the slope of the rock shelf or cut platform will be continued seaward by a built platform or "continental delta" (Gulliver). Thus a continental shelf will come into existence along the faulted margin of the land.

[9] N. M. Fenneman: *op. cit.*, p. 23.

Though, at this stage, the combined cut and built platform will still be narrow, and though the slope to its outer edge, which will be situated at the depth of wave base, will still be somewhat steep, the underwater profile will now have attained the form described by Davis as "grade"[10] and by Fenneman as the "profile of equilibrium."[11] While the seaward slope of the platform, as it grows in width, will afterwards become progressively less steep, and the depth of water at any particular point on the landward portion of it will continue to increase,[12] the profile will remain graded throughout the cycle.

Provided that complete exportation of the waste to be deposited at another part of the coast-line does not take place as a result of currents sweeping along the stirred sediment above the wave base, a constant stream of material will, at this stage, be carried seaward over the edge of the platform to rest in layers upon and with the inclination of the continental slope. Such inclined layers are, as Chamberlin points out, foreset beds analogous with the foreset beds of a delta.[13] The platform will thus, normally, grow rapidly seaward; and the width of the built platform will soon be much in excess of that of the cut platform, this excess depending mainly (in the absence of loss of waste to, or gain from, other parts of the coast as a result of transportation by currents) upon the amount of waste supplied by streams as distinct from that broken by wave action.

Shore Features in Plan. While, as pointed out above, destruction of the initial scarp is likely to be at first somewhat delayed, after wave action has become effective the shore-line will retreat rapidly; and this will be evidenced by the failure of dissecting ravines to attain or maintain grade, especially in the more resistant rocks. In plan, one of the first effects will be that the shore-line will assume minor irregularities as marine erosion picks out the variations of resistance inevitably present in the shore rocks from point to point. A later effect will be the development of broad reëntrants where large areas of weak rocks reach the sea or where for any reason the initial scarp is low. At low parts of the scarp there is a smaller quantity of talus slipping down upon the shore as the base of the cliff is cut back, and, as the talus thus originating prevents further undercutting and so delays the work of marine erosion until it is itself transported seaward by the waves, it is clear that where the cliffs are low the shore-line will retreat rapidly, and that those portions of the shore-line where the cliffs are high will soon project somewhat as broad salients beyond the general line. Since, if we continue to assume that in the pre-faulting cycle of subaërial erosion planation was incomplete, the areas of weaker rocks

[10] W. M. Davis: The Outline of Cape Cod, in Geographical Essays, Boston, 1909, pp. 690-724 (first published in *Proc. Amer. Acad. Arts and Sci.*, Vol. 31, 1896); reference on p. 701.

[11] N. M. Fenneman: Development of the Profile of Equilibrium of the Sub-aqueous Shore Terrace, *Journ. of Geol.*, Vol. 10, 1902, pp. 1-32; reference on p. 1.

[12] W. M. Davis: *ibid.*, p. 703.

[13] T. C. Chamberlin: Diastrophism and the Formative Processes: VI, Foreset Beds and Slope Deposits, *Journ. of Geol.*, Vol. 22, 1914, pp. 268-274; reference on p. 268.

will in that cycle have been reduced to lower relief than the resistant rock areas, it is apparent that broad differences of rock strength will be effective in two ways in producing sinuosity of the shore-line: first on account of the smaller resistance to erosion offered by the weaker rocks, and secondly on account of the smaller height of the initial scarp on these rocks (Fig. 7).

It follows from the above argument that the absence of conspicuous salients and reëntrants developed as an adjustment to structure along the retrograded shore-line of a region of diversified structure is an indication of youth.

The changes in the features of fault coasts outlined in the foregoing paragraphs are those characteristic of their youth and adolescence. After

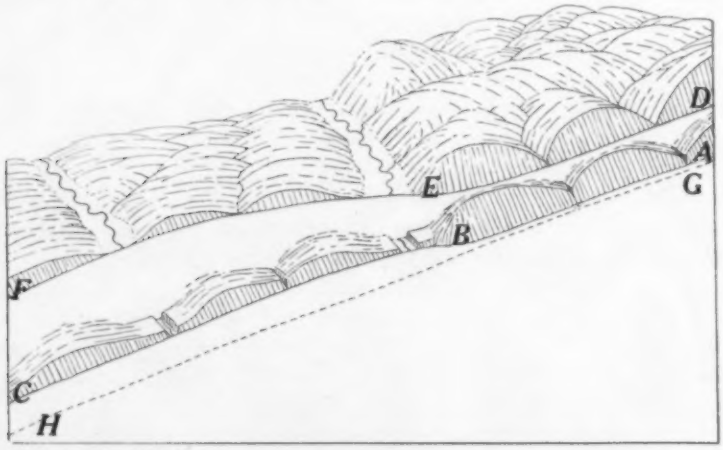

FIG. 7—Development of an embayment of the shore-line in an area of weak rocks. *AB*, resistant rocks; *BC*, weak rocks; *DEF*, form of the shore-line at a later stage; *GH*, line of the initial shore determined by a fault. In the pre-faulting cycle of subaërial erosion the weak rocks had been reduced to much lower relief than the resistant rock area.

the initial delay, to which reference has previously been made—a delay which may safely be assumed to be short—the stages of youth must, for reasons already stated, be passed through rapidly, and consequently we are much more likely to find fault coasts in the mature than in the young stage.

Young fault coasts must, as we have seen, differ widely in many important respects from young coasts of other types; but when maturity is reached they must very closely resemble mature depressed coasts or uplifted coasts with contraposed shore-lines (Clapp; see footnote 17), the development of either of which may have occupied an immensely longer period.

Small development of salients and reëntrants as a result of adjustment to structure will still indicate probable fault origin early in the stage of

maturity, and stream courses doubling back on themselves to reach the sea, if such have been developed, may be expected to persist. Otherwise proof of the fault origin of a mature coast may be impossible or may depend upon special, local features.

COMPLICATIONS

In the foregoing discussion it has been assumed that retrogradation of the shore-line goes on continuously; but it is possible that at some stage, perhaps quite early in the cycle, the waves become overloaded, owing perhaps to an increase in the amount of waste brought down by rivers, causing wave attack on the shore-line to become ineffective. In such a case adjustment of the form of the shore-line to the structure of the coastal land must cease, and progradation may occur. While the continental shelf will continue to grow in width the growth will take place entirely by addition of material at the outer edge.

INTERRUPTION OF THE CYCLE AFTER A PERIOD OF STILL-STAND FOLLOWING FAULTING

Interruption by Depression. Interruption of the first cycle by depression, after an appreciable amount of modification of the initial form has taken place, will give a new initial shore-line of the ordinary depressed type, which need not be further considered here.

Interruption by Uplift. Interruption by uplift taking place while the built platform of the interrupted cycle is still somewhat narrow, even though maturity may have been reached, will result in the exposure of a strip of sea floor as a narrow coastal plain with an appreciable seaward slope. Only this case will be considered (Fig. 8, blocks *B* and *C*).

The new initial shore-line (block *C*) will be simple, and the initial slope of the coastal plain will be such that the attack of the sea on the land will begin at once.

"The sea is able to begin the production of the submarine platform immediately off shore, shore-grade is quickly attained, youth and adolescence are of short duration, and the coast reaches a mature stage of development without the production of an off-shore bar."[14]

A recently published diagram (Fig. 9) of the western side of Osaka Bay, Japan, by Cushing,[15] which was received after this article was written, illustrates very well a sequential form developed from the stage represented in block *C* of Figure 8. A comparison of Figure 9 with block *C* of Figure 8, however, brings out certain differences. In the Osaka Bay example there appears to be no cut platform, indicating that deposition

[14] F. P. Gulliver: *op. cit.*, p. 184.

[15] S. W. Cushing: Coastal Plains and Block Mountains in Japan, *Annals Assoc. Amer. Geogrs.*, Vol. 3, 1914, pp. 43-61.

along the initial shore in the first cycle was even more rapid than has been assumed by the writer in the theoretical case, so that the effects of wave attack were still inappreciable when retrogradation was followed by

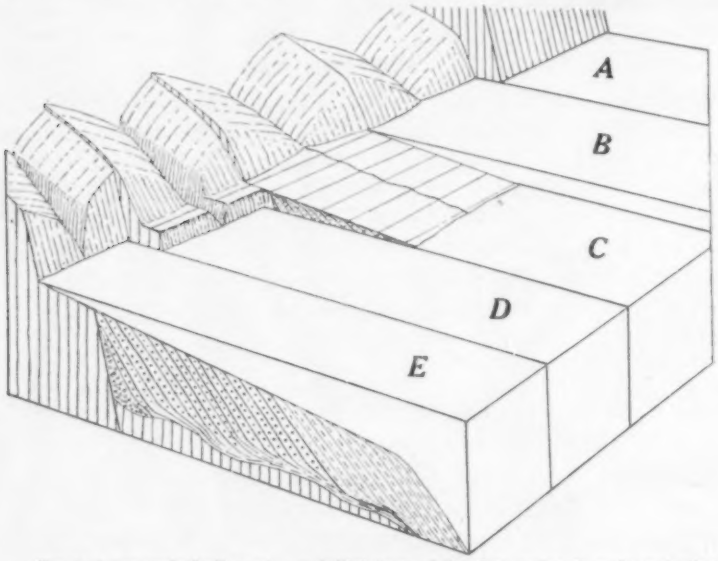

FIG. 8—A two-cycle fault coast. *A*, initial form of the first cycle; *B*, early maturity; *C*, the same, uplifted; *D* and *E*, sequential forms in the second cycle.

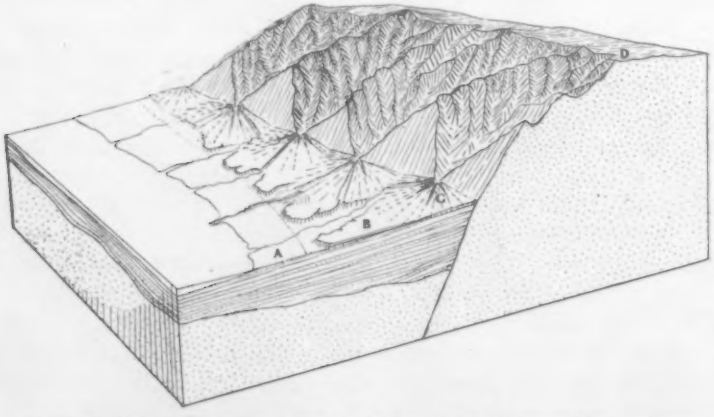

FIG. 9—Diagram of the western side of Osaka Bay, Japan. (After Cushing; reproduced with the author's permission.)

progradation, evidence of which is seen in the fans which border the old land. The stratification of the coastal plain is represented in the diagram as parallel with the surface, but, in his description of the region, Cushing

mentions updragging of the strata as proof of renewed uplift of the landward block.[16] The question presents itself whether the observed seaward dip may not be due in part to inclined deposition, that is to the initial dip of the foreset beds of the coastal plain.

Let us now return to our consideration of the theoretical case and to our assumption of uninterrupted retrogradation. The unconsolidated material of the outer part of the narrow coastal plain (Fig. 8, block *C*), the built platform of the first cycle, will be rapidly cut back, and the waves will soon beat upon the reëxposed fault scarp forming the seaward boundary of the cut platform. Professor W. M. Davis has suggested to the writer that a fault scarp thus reëxposed after burial by sediment might be termed "resurrected"; and so the fault coast developed upon such a scarp in a second or later cycle may be termed a "resurrected fault coast." It will be noted that such a coast has something in common with the contraposed shore-line type of Clapp.[17]

Redistribution of the waste derived from the destruction of the coastal plain will cause the built platform of the new cycle to grow rapidly seaward.

Rejuvenation of the topography of the coastal land will have begun very soon after uplift as a result of rapid trenching by extended rivers across the steeply sloping coastal plain. As the shore is cut back further rejuvenation will take place. On resistant rocks, however, the amount of stream work accomplished during rapid recession of the coast to the resurrected fault scarp may be slight.

After this stage, the rate of retrogradation on an older mass of resistant rocks will be very much slower, but the cut platform of the earlier cycle will eventually be destroyed. Block *D* of Figure 8 represents the coast when the uplifted cut platform has been partially destroyed, and block *E* a later stage when it has been completely cut away. The history of the now fully mature coast need not be followed further.

Successive uplifts will be followed by precisely similar consequences provided that matters are not complicated by elevation above or near to sea-level of the older mass of the seaward block.

Interruption of the first cycle by diverse movements, tilting, warping, etc., may occur, but the complications thus introduced need not be discussed here.

Examples of Fault Coasts in New Zealand

The Marlborough Coast

A Resurrected Fault Coast. The east coast of Marlborough (Fig. 10) from Cape Campbell southwestward to Kaikoura Peninsula may be described as a mature, resurrected fault coast with a projecting delta, built by a large river—the Clarence—in the first cycle, cut back somewhat after

[16] S. W. Cushing: *op. cit.*, p. 46.

[17] C. H. Clapp: Contraposed Shorelines, *Journ. of Geol.*, Vol. 21, 1913, pp. 537-540.

uplift, and added to in the present cycle, the modern portion of the delta passing northeastward into a continuous strand plain of very recent origin[18] (Figs. 12, 13, and 14). The rocks of the region are mainly weak mudstones, resistant, deformed limestone and older, resistant, deformed clastics,[19] each in turn forming the shore for a distance of several miles. Unfortunately, the physiographically very important boundaries between the mudstones and the limestones are not shown on the only detailed maps of the region, those of McKay.[20]

The mudstone areas are of moderate relief, having been reduced to mature forms and in some places completely planed down during periods

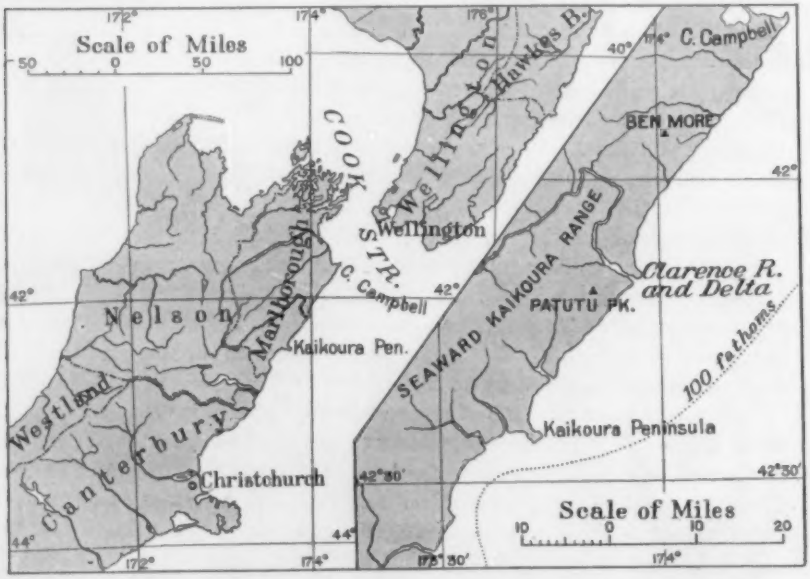

FIG. 10—Sketch-map of central New Zealand.

FIG. 11—Sketch-map of the east coast of Marlborough.

of still-stand occurring between movements of uplift, the last of which took place so recently that, even on these weak rocks, small streams are not

[18] C. A. Cotton: Preliminary Note on the Uplifted East Coast of Marlborough, *Trans. N. Z. Inst.*, Vol. 46, 1914, pp. 286-294; reference on pp. 291-293.

[19] The mudstones referred to in the text are the predominant beds underlying and overlying the Amuri limestone in the area mapped by McKay (see footnotes 20 and 21) as "Cretaceo-Tertiary and Cretaceous;" the limestone referred to is the Amuri limestone of the same series; and the resistant, deformed clastics are the pre-Cretaceous rocks or older mass of the region. In addition to the rocks mentioned a very resistant conglomerate, the Great Marlborough conglomerate (J. A. Thomson: Report of Palaeontologist, *Geol. Surv. of N. Z., 7th Ann. Rept.*, 1913, pp. 121, 123-134; C. A. Cotton: On the Relations of the Great Marlborough Conglomerate, etc., *Journ. of Geol.*, Vol. 22, 1914, pp. 346-363), reaches the shore at several places with mudstone on either side.

[20] A. McKay: On the Geology of the East Part of Marlborough, *Geol. Surv. of N. Z., Rept. Geol. Expl. dur. 1885*, pp. 27-136, 1886; map opp. p. 42.

A. McKay: On the Geology of Marlborough and South-east Nelson, *Geol. Surv. of N. Z., Rept. Geol. Expl. dur. 1888-89*, pp. 85-185, 1890; map opp. p. 96.

yet graded with respect to present base level and larger streams still occupy narrow-floored, precipitous-sided valleys.[21] The measure of the relief rarely exceeds 600 or 700 feet.

On the resistant rocks, both the limestone and the older-mass clastics, the relief is strong, a limestone peak, Ben More, four miles from the sea reaching a height of 4,081 feet, and the older-mass rocks southwestward of the Clarence mouth rising to 2,190 feet one mile inland, to 3,820 feet in Patutu Peak two miles inland, and to much greater heights in the Seaward Kaikoura Range at an increasing distance from the sea. (Fig. 15 is a profile of the coast at this point, drawn to the same horizontal and vertical scale.) On other parts of the coast the relief on these rocks is somewhat less strong, but they nowhere present subdued forms. In these rocks the rivers, with the exception of the largest, are not graded, and dissection with respect to present base level is still in a very young stage.

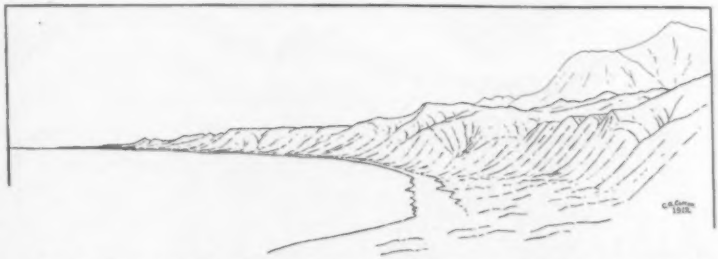

FIG. 12 – View of the Marlborough coast, looking southward. The cliffs of the mature coast appear on the right, the strand plain in the foreground, and the projecting delta on the left.

The continuous cliffs of the coast, though bordered now by a strand plain, are remarkably well preserved even where composed of mudstone, thus showing that, quite recently, the shore-line was receding at all points.

The line of these cliffs has the simple curves of a mature coast, but it exhibits a remarkable indifference to structure, explicable only on the hypothesis of rapid development from an initial faulted form outlined on an earlier page, and quite inexplicable on the only alternative hypothesis, that of development to maturity by an enormous amount of cliff-recession from some other initial form of coast. A mature coast developed in the latter way on rock formations so strongly contrasted as those of Marlborough would show pronounced salients on the areas of resistant rocks, separated by bays where the weak mudstones reach the sea, on account both of the small resistance of the latter to wave attack and of their low relief. It seems probable that the width of the combined cut and built platforms would, in the latter case, also be much greater than that of the

[21] C. A. Cotton: *op. cit.* sub 18.

continental shelf[22] of the Marlborough coast. This is, however, debatable since the proportion of the total width occupied by the cut platform is a matter of inference; but reasons will be given in the next section for the belief that the cut platform is relatively narrow.

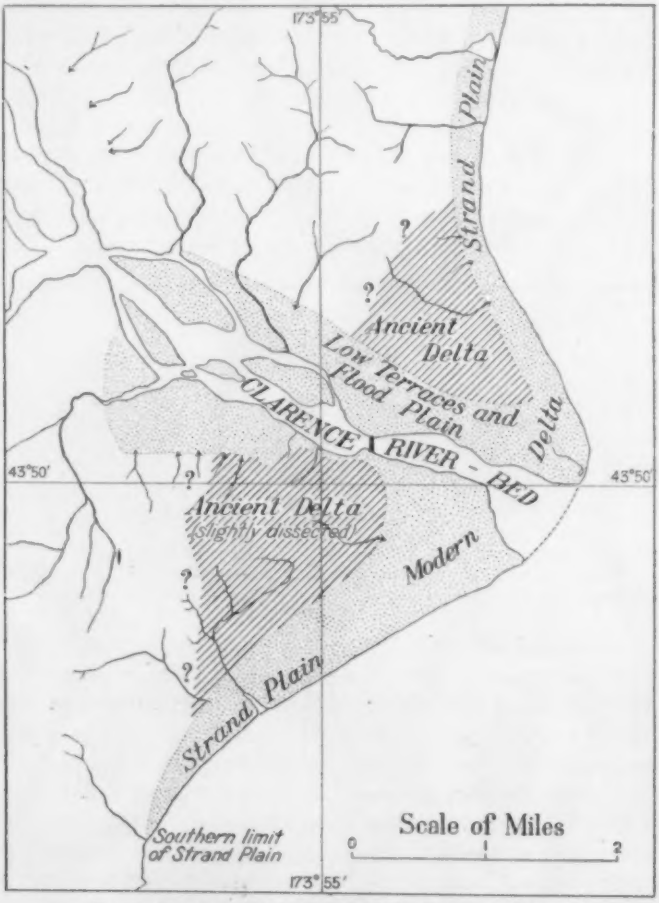

FIG. 13—Physiographic sketch-map of the Clarence delta.

Along this coast there is a general absence of islands, indicating that the depth to which the seaward block subsided along the initial fault was considerable; but at the southwestern end there is one large, land-tied island, Kaikoura Peninsula. This "island" certainly does not owe its

[22] It appears to the writer desirable to use the well-established term "continental shelf" for this feature even when it fringes an island. The use of the adjective "continental" is unfortunate, but the use of a second term "island shelf" for what is genetically the same feature does not afford a satisfactory way out of the difficulty.

position as the only prominent salient on the coast to any great power of resistance to wave attack possessed by its rocks, for it is composed of weaker materials than the adjacent mainland. The initial island was probably the unsubmerged portion of an unevenly depressed seaward block. Its flat top and terraces at lower levels indicate that it has been completely planed off once by marine erosion and partially planed during several later periods of still-stand separating episodes of uplift. The

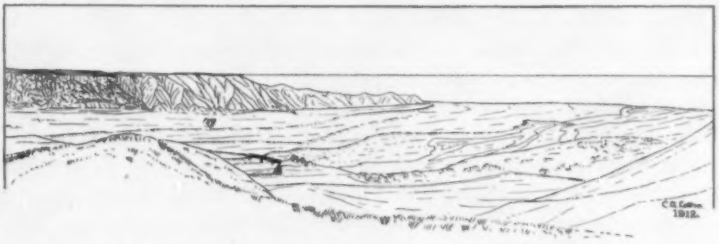

FIG. 14—View looking seaward from the surface of the uplifted Clarence delta, showing part of the uplifted delta on the left, low terraces and flood-plain of the Clarence River in the center, and the modern delta on the right.

"island" is now tied to the mainland by the confluent deltas of several streams forming the Kaikoura Plain, where locally the shore-line has advanced seaward owing to a very abundant supply of waste from the Seaward Kaikoura Range.

Bordering this mature coast there is, as required by the hypothesis, a continental shelf or submarine platform (see Figs. 11 and 15), the outer edge of which is about twelve miles from the shore and at a depth of about

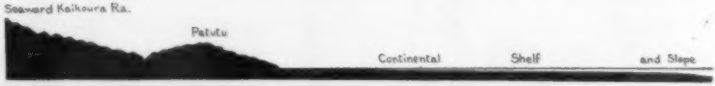

FIG. 15—Profile of the coast southward of the Clarence River. (The profile of the continental slope is hypothetical, as the available soundings indicate merely deep water, not definite depths, beyond the edge of the shelf, which is situated at a depth of about 70 fathoms.)

seventy fathoms. Though not very numerous soundings have been recorded, the Admiralty chart (New Zealand, Sheet 8) shows a sufficient number to make it apparent that the platform slopes evenly and that the underwater profile is graded.

The Fault Line Must Be Situated Close to the Present Shore-Line. For reasons which follow, the writer considers it highly improbable that the shore-line can have receded more than a very short distance from the fault line. The evidence in favor of this view also seems to afford proof of the correctness of the application of the fault hypothesis to this coast.

It is important to recall that the average relief of the land immediately behind the present shore-line is very strong; also that the dissecting valleys of the present cycle are quite immature even on the weakest rocks, indica-

ting an extremely youthful stage of dissection in the present cycle; and finally that there is an absence of notable salients and reëntrants in the shore-line itself. In view of these facts it seems impossible that the coast can have been cut back far from the fault line since the last uplift. If, for example, even a mile or two of recession had taken place on a coast composed in part of very resistant and in part of very weak rocks, with a straight shore-line transecting all structures indifferently as the mature result, the rate of recession of the coast on the very weak rocks must have been enormously retarded to allow recession on the neighboring mountainous areas of very resistant rocks to keep pace with it. Under such conditions the areas of weak rocks would, at the same time, have been reduced by subaërial agencies to lowlands of small relief with all valleys widely opened and all streams graded with respect to present sea-level as base level; whereas, as pointed out above, the dissection even on these areas of weak rocks is characterized by extreme youth of the erosion features. Only a small fraction of the twelve-mile-wide submarine platform can, therefore, be regarded as cut landward from the fault. The remaining larger fraction must be an apron of waste built out upon the submerged block. This is not surprising when the large quantity of waste constantly being poured into the sea by the torrential stream of this mountainous region is taken into account. The supply of waste from this source is undoubtedly far in excess of that resulting from wave action along the shore, and so it is only to be expected that the waste apron will greatly exceed in width that portion of the platform cut upon the basement rocks of the landward block.

The waste-apron portion of the submarine platform will really consist of two distinct portions, the outer a true built platform, an entirely constructional feature built outwards since the present position of sea-level was assumed, and the inner a part of the cut platform, which has been cut, however, upon the waste apron (or aprons) built forward when the whole region stood lower and when the sea was attacking the coast at higher levels. (In Figure 8 the theoretical structure of such a platform, developed in two cycles, is shown in section on the side of block *E*. The sediment of the current cycle is indicated by lighter lines than that of the earlier cycle.)

The Coast Is Not a One-Cycle Fault Coast. Reasons must now be given for describing the Marlborough coast as a mature, resurrected fault coast as distinguished from a mature, one-cycle fault coast. As indicated in Figure 8, block *D*, a resurrected fault coast is characterized in its early mature stage by the presence of an uplifted cut platform or remnants of one. At a later stage, however, these will disappear (block *E*); and the narrower the cut platform of the earlier cycle the shorter-lived it will be in the later cycle. A few narrow remnants of uplifted marine cut platforms are present in Marlborough, but they are not as a rule conspicuous

features. Their general absence, in view of the small amount of recession of the coast landward from the fault which, it seems, can possibly have taken place in the present cycle, must indicate that at no period since the initiation of the coast fault has recession proceeded far landward.

In addition to the remnants of uplifted cut platforms the Marlborough coastal region presents evidence of extremely recent, strong uplift, chiefly in the form of (a) rejuvenated topography well developed on the areas of weak rocks but only incipient on the areas of resistant rocks; and (b) the presence at the mouth of the Clarence River of the delta previously referred to, which is as yet but little dissected though uplifted 500 feet.[23]

This delta of the Clarence was built out from a shore the line of which practically coincided with that of the present coast, and that shore appears to have been a young, one-cycle fault coast the scarp of which descended into deep water, for the massive conglomerate of which the foreset portion of the delta is composed may be traced to sea-level, 500 feet below former sea-level, at a distance of about a mile from the former shore, and it extends to an unknown greater depth. The presence of this delta, therefore, proves that the uplift of which there is evidence took place later than the formation of the initial scarp; that is to say, it proves that the coast is of the "resurrected" type.

The Post-Faulting Uplift Regional, Not Differential. There remains to be considered an alternative hypothesis that suggests itself in explanation of the development of the present coast from the fault coast of the first cycle (that in which the 500-ft. delta was built). To this may be given the explanatory name "hypothesis of renewed faulting," thus distinguishing it from the "hypothesis of regional uplift following faulting" upon which the preceding arguments are based.

Obviously renewed faulting with uplift of the landward block only, and the formation of a new initial fault coast, is a possibility that must be taken into account. The hypothesis has, indeed, the advantage of dispensing with the necessity of explaining the destruction of a coastal plain after uplift. In the concrete case under discussion, however, the hypothesis fails to explain the uplift of the Clarence delta; for the delta was, as shown in the last section, built out upon the seaward block. Clearly, therefore, in the case of the Marlborough coast, post-faulting uplifts have affected the seaward as well as the landward block; in other words, they have been regional and of the same character as those postulated in the theoretical study of resurrected fault coasts on an earlier page.

The diagrams in Figure 16 represent stages in the growth of a composite (i. e., two-cycle or multi-cycle) delta, which, like that of the Clarence, has been built by a vigorous river in front of a fault coast where wave action has usually been powerful, sometimes succeeding in cutting back the shore even at the river mouth in the face of an abundant supply

[23] C. A. Cotton: *op. cit.* sub 18.

of waste, though sometimes there has been an excess of waste leading to active delta-building and progradation of the shore. In the figure, *A*

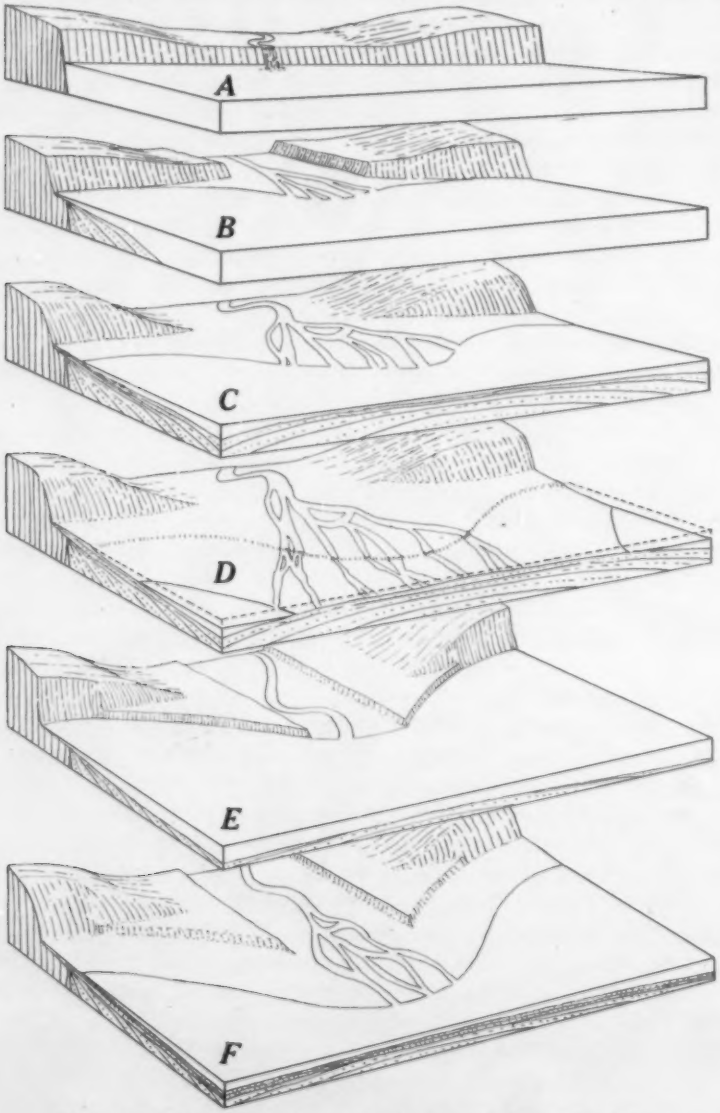

FIG. 16—Diagrams of stages in the growth of a composite delta with a history similar to that of the Clarence delta.

represents the initial stage, and it is assumed that a preëxisting valley of the river has been transected by the scarp of the initial coast. *B* represents

a stage when the shore has been cut back somewhat and a submarine platform has taken form, allowing the growth of a delta to begin. At stage *C* the submarine platform and delta have grown considerably. *D* represents the same stage as *C* after uplift has taken place, the form represented being now the initial form of a new cycle. At stage *E* the attack of the waves has triumphed for a time, as has certainly been the case at a corresponding stage in the history of the Clarence delta, so that the front of the uplifted delta has been cut away. *F* represents a stage of renewed delta-building and progradation of the adjacent coast corresponding to the present state of the coast in the neighborhood of the Clarence River.

EXAMPLES NEAR WELLINGTON

The coasts of the southwestern extremity of the North Island of New Zealand, both that facing southward and that facing northwestward, are regarded by the writer as sequential forms of fault coasts. In an earlier paper, in which these coasts have been described,[24] evidence of uplift has been put forward, and so the coasts may be provisionally termed resurrected fault coasts; but it remains uncertain whether the uplift has been regional or has been by renewed faulting. There is in this case no uplifted delta, nor has any portion of the platform built beyond the line of the initial coast, if uplifted, escaped destruction to bear witness that the seaward region has shared in the uplift of the land.

While evidence of uplift of the land is to be found in both the eastern and western portions of the area included in Figure 17, there is a central area of subsidence, the area occupied by Port Nicholson and a small adjacent land area with an obviously drowned shore-line, and on the northwestern coast there is an area of less extensive subsidence including the drowned valleys forming Porirua Harbor. It is uncertain whether the movements resulting in the production of these sunken areas were or were not in part contemporaneous with the rise of the adjacent areas, but they seem to have been mainly later.

The uplift of over 200 feet in the eastern and western portions of the Wellington district, which initiated the latest of a succession of brief cycles of both subaërial and marine erosion (the latter slightly disturbed by a further small movement within historic times), must have taken place very much earlier than the latest significant movement in the Marlborough coastal region. This is indicated by the fact that valleys in the Wellington area have been well opened out in this cycle though they are excavated in resistant rocks. In view of this fact it is at first sight rather surprising that considerably larger areas of uplifted cut platforms are preserved, corresponding to stage *D* of Figure 8; but the explanation appears to be that the duration of some at least of the earlier cycles (subsequent to

[24] C. A. Cotton: *op. cit.* sub 18.

the formation of the initial fault) was also longer here than in Marlborough. Platform remnants on the southern coast are shown in Figures

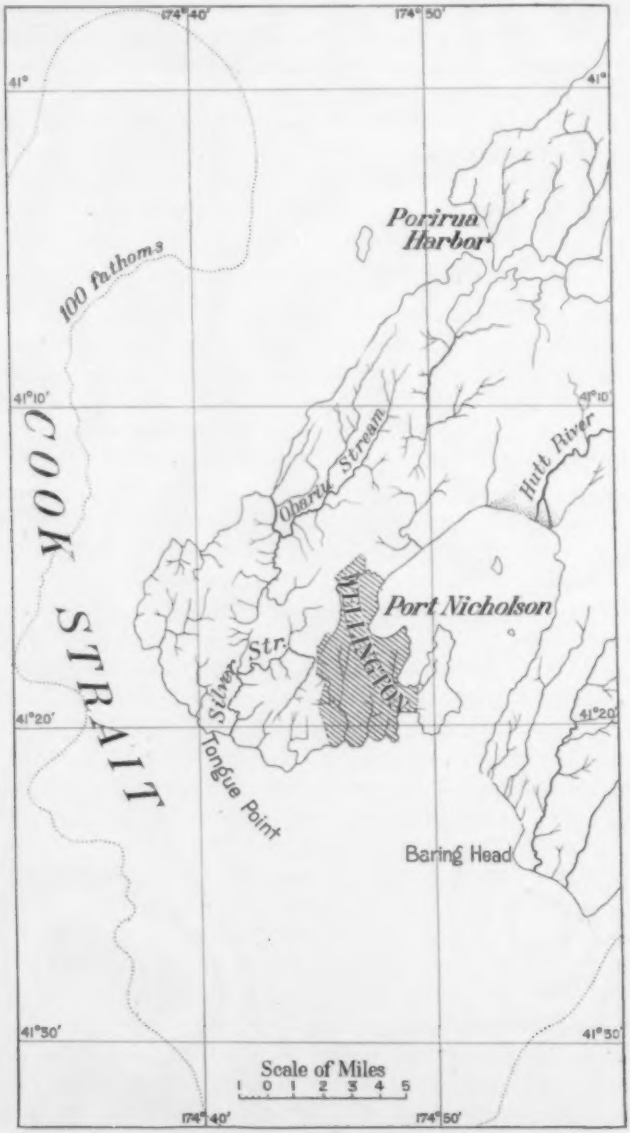

FIG. 17—Sketch-map of the coasts in the vicinity of Wellington.

18 and 19. In Figure 18 remnants of two platforms and in Figure 19 remnants of three are seen one above another.

The features of the shore-line are of a similar nature to those which will be found in the case of a contraposed shore-line;[25] but the writer considers the explanation based on the fault-coast hypothesis probably correct because of the presence here of streams rising near the coast and making long excursions inland before eventually reaching the sea, a type of stream course which was shown, on an earlier page of this paper, to be likely to occur on a fault coast. Among the most conspicuous of such courses are those of the Ohariu and the Silver Stream (Fig. 17).

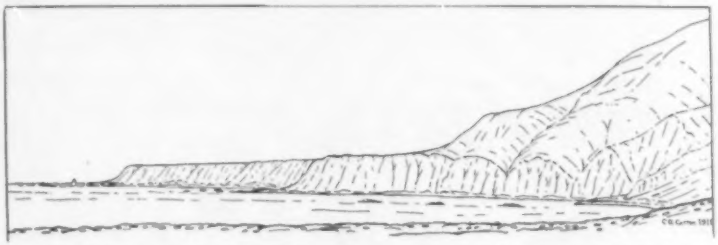

FIG. 18—Two remnants of cut platforms, each with a thin covering of gravel, at Tongue Point, Wellington. The lower and broader platform is at a height, at the rear, of 240 ft., and the upper remnant, of 450 ft.

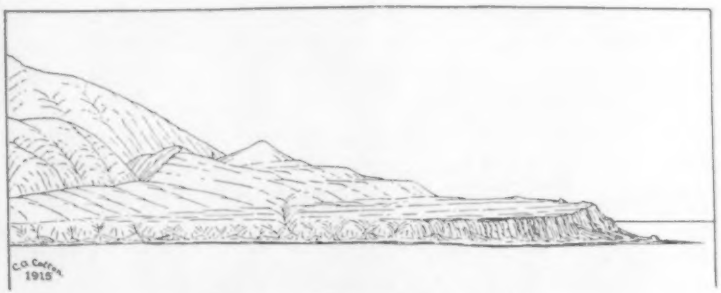

FIG. 19—Platform remnants at Baring Head, Wellington.

The narrowness of the continental shelf does not in this case indicate youth, for its growth is interfered with by the strong tidal currents of Cook Strait. The irregularity of the edge of the shelf as defined by the one-hundred-fathom line (Fig. 17) is, no doubt, due largely to the same cause. A pronounced salient of the shelf opposite the subsided Port Nicholson area, where a reëntrant of tectonic origin might be looked for, emphasizes the fact that the shelf is largely a built feature. This salient is difficult to explain, for, though the Hutt River here supplies a large and continuous stream of waste, most of this is trapped in the Port Nicholson depression, which has not yet been filled. Possibly the shelf

[25] C. H. Clapp: *op. cit.* sub 17.

broadens normally with increasing distance from tide-swept Cook Strait, but has been cut off southeastward by recent subsidence which has probably taken place beyond the area with which we are at present concerned.

ONE-CYCLE FAULT COASTS

A Miniature Example at Wellington. A miniature example of a one-cycle fault coast is provided by that portion of a young fault scarp at Wellington which forms the northwestern shore of Port Nicholson (Fig. 17). The fault scarp was first described by Bell[26] and later by the writer.[27]

The scarp trends southwest and northeast and runs inland in both directions, its northeastern continuation extending far up the valley of the Hutt River. The fault cuts a sub-mature surface with a somewhat steep general slope towards Port Nicholson, the proximal portions of transected spurs alternating with streams the largest of which are mature at their mouths. The initial scarp facing the sea must have presented the appearance of a sharply cut section, the trace of which in plan would be a simple line. At sea-level this line would be broken only by slight embayments at the mouths of three of the larger streams the valleys of which were slightly drowned by a small movement of depression on the landward or upthrow side of the fault. The height of the scarp above sea-level would vary according as it cut across spurs or ravines, and it would, therefore, present the appearance of a line of facets. The slope of the scarp would be probably less steep than the hade of the fault, for, if the latter were steep, material would slide away from the growing scarp until a slope of equilibrium was reached. All the smaller streams would cascade from the mouths of hanging valleys. Deep water would extend close in to the base of the scarp unless a very large amount of talus had accumulated during faulting. In any case there would be no wave-cut platforms at the base, such as would be present if the line of cliffs had been cut by marine erosion.

These characteristics are still recognizable, though they have been somewhat modified in the post-faulting period. Two types of post-faulting modifications can be recognized—subaërial and marine. As subaërial modifications we find, throughout the length of the scarp, notches that have been cut by revived streams in the bottoms of pre-faulting ravines; but the smaller of these are still hanging. At the southwestern end of the scarp, where it runs inland, the edges of the initial facets are rounded off, mainly, no doubt, by soil creep. As a result of modification by marine erosion there are now, along the shore of Port Nicholson, sharp-edged facets which are not, strictly speaking, remnants of the fault scarp, but are wave-cut cliffs worn back a little from the fault line. Narrow rock platforms

[26] J. M. Bell: The Physiography of Wellington Harbour, *Trans. N. Z. Inst.*, Vol. 42, 1910, pp. 534-540.

[27] C. A. Cotton: Notes on Wellington Physiography, *Trans. N. Z. Inst.*, Vol. 44, 1912, pp. 245-265; reference on p. 257.

are present at the base of these cliffs. Small deltas have filled the drowned mouths of the larger streams and now project slightly beyond the general line of the shore, while the Hutt River, entering Port Nicholson from the northeast, has built a larger delta part of the way along the scarp.

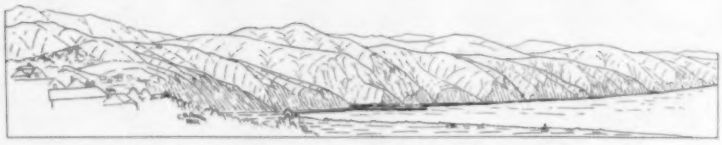

FIG. 20—The one-cycle fault coast formed by the Wellington fault scarp.

The Coast of Southern Marlborough. A short stretch of coast that is perhaps a young, one-cycle fault coast is to be found in southern Marlborough, extending a short distance southwestward from Kaikoura Peninsula (Fig. 11).

The most remarkable feature of this coast is the narrowness, or absence, of the continental shelf. A depth of 200 fathoms "and no bottom" is recorded on the Admiralty chart (New Zealand, Sheet 8) at a distance of about two miles from the land, and a great depth of water is vouched for by local fishermen. This suggests recent subsidence along a fault line close to the present shore; and the land presents the appearance of a fault scarp (Fig. 21), as though a strip had recently subsided along

FIG. 21—The Marlborough coast southwestward of Kaikoura Peninsula.

an arcuate line a little within that of the initial scarp of the resurrected fault coast to the northeast that has been already described. A very similar result might, however, have been produced by off-shore subsidence as a result of renewed movement on the original fault (if we may assume that the fault coast now recognized to the northeast formerly extended along this portion of the coast also). Such off-shore subsidence would in most cases be followed by increased activity of wave action on the shore, producing a cliffed shore-line not unlike that of a young fault coast. Further study in the field is necessary before a more definite statement as to the nature of this strip of coast can be made.

The Thames Fault Coast. This article would be incomplete without a brief reference to the western coast of the Hauraki, Coromandel, or Cape Colville Peninsula in the North Island of New Zealand (Fig. 22), where, in the neighborhood of the mining town of Thames, the presence of a fault coinciding with the shore-line and hading seaward at an angle of 45° has long been known from mining operations. It is known locally as the "beach slide." A long and imposing fault scarp which is the superficial

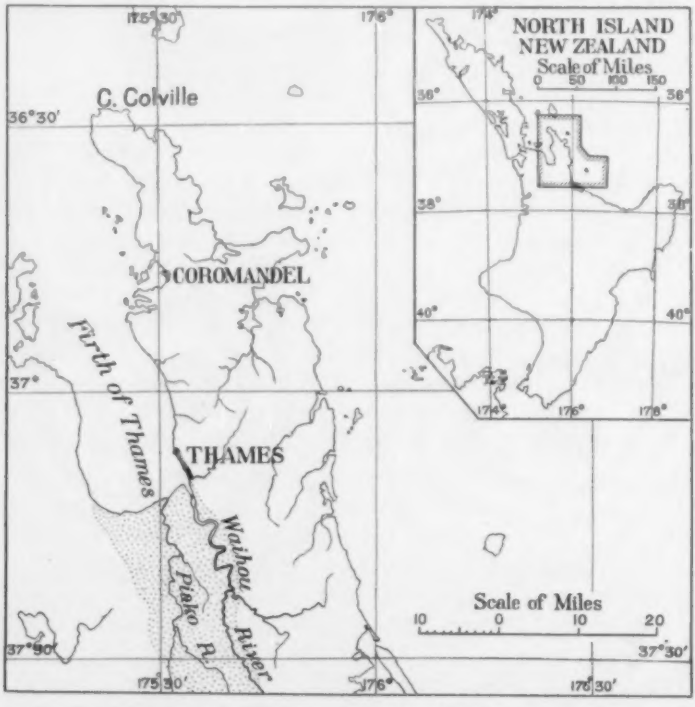

FIG. 22—Sketch-map of the Hauraki Peninsula. The inset map of the North Island of New Zealand indicates the locality.

development of the beach slide and associated parallel faults was first recognized as such by Lindgren,[28] and the southern portion of it has recently been described by Henderson,[29] who has also summarized the observations of a number of other authors on the subject.[30]

The shore-line of the fault coast may, by its simplicity on the map (Fig. 22), be recognized, extending about twenty miles northward of Thames. It extends also many miles to the south, separating a maturely dissected,

[28] W. Lindgren: The Hauraki Goldfield, New Zealand, *Eng. and Min. Journ.*, Feb., 1905, p. 261.
[29] J. Henderson: The Geology of the Aroha Subdivision, *N. Z. Geol. Surv. Bull. 16*, 1913.
[30] *Ibid*, pp. 49-51.

mountainous region, composed mainly of volcanic rocks, on the east, from a down-thrown area, invaded by the sea, on the west. A great part of this area has been reclaimed from the sea by the rapidly growing, confluent deltas of the Waihou and Piako Rivers and their tributaries. (This area is stippled in Fig. 22.) The unfilled, northern portion of the depressed area is known as the Firth of Thames.

Notable recession of the shore-line from the fault at Thames has not taken place, mainly, no doubt, on account of the feebleness of wave action in the landlocked Firth of Thames, and partly on account of the rapidity of sedimentation, though the initial depth of water close to the shore must have been very great, as a bore-hole has been put down to a depth of over 1,100 feet through silt without reaching solid rock.[31]

Northward beyond the fault coast and on the whole eastern seaboard there is a young depressed coast. The latest movement, therefore, of importance in determining the outlines of the Hauraki Peninsula appears to have been a tilt to the north and northeast of a surface of strong relief, maturely dissected in a single cycle, the Thames fault coast forming the western boundary of the tilted area and separating it from the adjacent deeply submerged block. A comparison of Figure 22 with Figure 3 shows that the western coast of the Hauraki Peninsula, as a whole, affords an example of a transition from a fault coast to a depressed coast.

[31] C. Fraser: The Geology of the Thames Subdivision, *N. Z. Geol. Surv. Bull. 10*, 1910, p. 32.

THE GEOGRAPHICAL FACTOR IN AGRICULTURAL INDUSTRIES*

We have in the middle West, between the 98th meridian and the Rocky Mountains, a stretch of prairie land known as the Great Plains. From the 33rd parallel to the Canadian border the climatic conditions are singularly uniform, and the soil, though varied, is generally very fertile. The one great handicap of the region is insufficient rainfall. The population is sparse and doubtless will continue so, but the transportation facilities are excellent and constantly improving. Roughly speaking, half of our commercial grain crop is produced in that region. Wheat is the chief money crop and should remain so; but the continuous and exclusive production of wheat is out of the question. The labor requirement of the wheat crop covers but a few weeks in the year and the time limits are sharp. Furthermore, continuous wheat production leaves the land weedy and yields decline rapidly. A rotation involving corn on the land once in three or four years obviates this weed trouble and lengthens the labor season by a few weeks. But corn is precarious as a grain crop because of the late summer droughts. These droughts do not affect so seriously the value of corn as a forage crop, but a forage crop is too bulky to justify long shipment to market. Thus we find that if we would have permanent and prosperous agriculture on the Great Plains and continue the production of our share of the world's wheat supply we must establish there some animal industry to utilize the forage incident to the rotation requirements of wheat production and to provide at the same time continuous employment for a larger proportion of the labor needed for the wheat crop.

This is one aspect of the situation. Another view is that west of the Great Plains lie the upland ranges of the Rocky Mountains with their rich summer pastures and sheltered valleys for winter feeding. This is a vast natural breeding ground for live-stock. From these ranges the meat animals move eastward across the Great Plains to eastern markets. But the range stock must be fattened for market and they are "fed in transit," as the saying is. Some of this feeding in transit is now done on the Great Plains, and a much larger proportion of it might well be, without reducing, but rather increasing, the wheat output of the region.

Furthermore, within the Great Plains the arable lands are interspersed with non-arable grass-producing lands capable of supporting vast herds of cattle if supplementary and winter feeds are provided. Thus it is clear that if we have a proper understanding of the geographical factors in the situation we can take up more intelligently the task of adjusting the interrelation of a group of associated industries through which we may hope to utilize most efficiently the natural resources of this great section of the country.

We hear, not infrequently, some most pessimistic utterances concerning the outlook for the industry of meat production in the West. We hear that our western range lands have been invaded by the wheat farmer and we must soon look to other countries for an increasing proportion of our meat supply. I feel confident that such fears are unwarranted. The former wasteful and inefficient methods of meat production must be and are gradually being replaced. The live-stock population of our western states is gradually increasing, and this increase may be expected to go on more rapidly in the near future and to continue for many years. The limit of our resources in this direction is not yet in sight. Is it not one of the functions of geographers to make the underlying features of this and similar situations a part of our common knowledge in

* This is part of a paper read on April 9, 1915, at the meeting in New York of the Association of American Geographers and the American Geographical Society.

order that our people may not suffer needless misapprehension, and may act wisely in dealing with the legislative and economic problems involved in the utilization of these resources?

Another illustration of the importance of the geographical factor in agricultural industries may be taken from our western irrigated lands. From the very nature of the case this is a problem in space relations. The aggregate area of our irrigated land in the United States is probably not much in excess of fourteen million acres, or about one-third of the area of the state of Iowa. But these lands are scattered over the entire western half of the country, which is but sparsely populated and can consume but a small proportion of the products of the irrigated land. Both the incoming supplies and the outgoing products must bear heavy transportation charges. Because of the cost of preparing the land for irrigation as well as of the cost of water the farming must be intensive in character, that is, the returns per acre must be relatively high.

The problem of profitable industries for our irrigated lands is rendered difficult because of the barrier of distance. And our irrigation farmers seem slow to grasp the significance of the barrier in relation to every phase of their existence. In the history of almost every irrigation enterprise in the West there has been a period of severe economic depression due to this fact of isolation. When a new section is brought under irrigation the first farmers find a ready local sale for their products at good prices. These prices are based upon the cost of the commodities at distant points plus the transportation charges. As soon as the local production exceeds the local demand the scale of prices automatically falls to a point determined by the cost in outside markets *less* the transportation charges. This looks, of course, like a very simple lesson in geography and one that might be learned by observation. But, as a matter of fact, it has been learned by our irrigation settlers only by experience and sometimes very bitter experience.

One naturally thinks of irrigated land as best adapted to the production of fruit and vegetables. But fruit and vegetables are both heavy and perishable, and in consequence the expense and risk of shipment to distant markets are relatively great. It is only in cases where climate or season give special advantages in a monopoly of the market that these industries become permanent and profitable. I refer to the citrus industry of California and the Bermuda onion industry of southern Texas as examples.

For the most part, the products of our irrigated lands come into direct competition with the products of our non-irrigated lands and must depend upon their somewhat larger yields and greater certainty of production to offset the disadvantage of distance to market. In general, we find that conditions on our irrigated land favor the production of forage crops and grain. Somewhat more than eighty per cent. of our irrigated land is devoted to crops of these two classes. Even with the most favorable transportation conditions, the distance which forage crops can profitably be moved is relatively small.

There are comparatively few instances in which these crops can be grown profitably on irrigated land to be shipped to market. We have, then, the problem of establishing industries to utilize them locally or of replacing them at least in part with other crops which can be shipped to market. Thus we may expect to see our irrigated land play an important part in live-stock production in the West.

As an instance of crop replacement I might mention the establishment of the production of long-staple cotton on the irrigated lands of the Southwest. This product is so high priced that the percentage of its value represented by transporation cost is small.

These instances will serve to illustrate the point that the single geographical factor of space relations is a very potent one in determining the character and relationship of our agricultural industries, especially in the western states. CARL S. SCOFIELD.

EXPLORATION OF THE RIO ANANÁS, BRAZIL

A real discovery as a result of exploration in new territory always clears up a host of related problems. We have already commented (*Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 216-217) on the good judgment of Colonel Theodore Roosevelt in selecting the unexplored region between the Madeira and the Tapajoz for his Brazilian expedition —a choice which made possible the largest results in the time available. "Through the Brazilian Wilderness" makes clear how the mysteries of the hydrography of the region were solved by the discovery of the Rio Theodoro. It is to be expected that one after another of the tributaries will be "tied up" with the main river through independent surveys until the whole region has been explored. Fortunately for the later expeditions, the main stream, which is the key to the region, is already laid down upon the map. Further explorations are now reported that outline the drainage of the Ananás, or Pineapple River, and its relation to the Theodoro. The information is conveyed in a letter from Colonel Roosevelt reprinted herewith by his kind permission:

OYSTER BAY, LONG ISLAND, N. Y.
DECEMBER 21, 1915

MY DEAR PROFESSOR BOWMAN:

You may be interested in the information I have just received from South America. About a year ago, under the direction of Colonel Rondon, Lieutenant de Souza, with ten *camaradas*, was sent down the Ananás, or Pineapple River, which you will see indicated in my book on the map opposite page 338. The expedition had a very hard time. They soon ran out of food. They had very bad times in the rapids and all of them fell sick. Finally they were attacked by Indians. Lieutenant de Souza fired one shot in the air; then the gun miss-fired. Four arrows struck him. He plunged into the river but was too badly wounded to swim and sank. At the time they were on an island making a canoe to replace one lost in the rapids. The other canoe had been taken over to the bank by two *camaradas* who had gone hunting. Two of the *camaradas* on the island escaped and, traveling through the forests, struck the Dúvida. A third also escaped by himself. He had been out hunting and discovered the Indians before they discovered him. He watched them for seven hours and after they had left he went to the camp, got de Souza's diary and a few other things and then descended the bank of the river into the Dúvida, descending for twenty-four days before he found the first rubber man. He then continued twenty-two days farther on foot before he finally managed to secure a canoe. The Ananás proved to be the Rio Cardosa, which I have marked on the same map. This must mean that the Upper Aripuanan, or Aripuanan proper, is a much shorter river than that branch which we ascended and takes its rise somewhere between this river which we descended and the Canumá.

I am sending a copy of this letter to Mr. Freshfield of the Royal Geographical Society.

Sincerely yours,
[Signed] THEODORE ROOSEVELT.

This letter shows that the Ananás is one of the numerous headwater branches of the Rio Theodoro and not the major tributary which it had been thought it might be. As it coincides with the Cardosa, which empties into the Theodoro in 10° 58′ S., the distance in a straight line from its source, in about 12½° S., to its mouth is about 125 miles. If it had turned out to be the Upper Aripuanan, which empties into the Theodoro in 7° 34′ S., this distance would have been about 400 miles. The Upper Aripuanan is undoubtedly the largest right affluent of the Theodoro. Nevertheless, it should be noted that the ample development of drainage arteries (due to the larger precipitation) on the edge of the Matto Grosso highland makes it just possible that some of these streams form part of the headwaters of the Aripuanan. But the probability is stronger than ever that the river descended by Colonel Roosevelt is the longest continuous waterway within the drainage system of the Rio Theodoro.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Retirement of Mr. Cyrus C. Adams. On December 3, 1915, Mr. Cyrus C. Adams retired from the staff of this Society after seven years' service as editor of the *Bulletin*, following in turn an earlier connection as editorial contributor dating from 1902. Though he discontinues the arduous duties of editorial management his name will still be found among the list of contributors—we hope for many years to come. His services to the Society have been varied and important, and under his hand the *Bulletin* grew from a slender magazine issued five times a year to a monthly of sixty-four and finally eighty pages.

The growth of the *Bulletin* was due partly to the rapid development of geography in higher education but largely to Mr. Adams' own contributions. The news sense which his journalistic training had developed made itself felt in the timeliness and interest of the items in the "Geographical Record," many of which he wrote himself. Polar exploration and the economic development of new regions, especially Africa, have been his special topics. His early manhood coincided with the heroic age of African exploration, and he read with avidity the accounts of the great travelers. In its pages the *Bulletin* has often reflected the affectionate intimacy of his knowledge of African geography.

One of his aims has been to raise the standards of commercial map-publishing, which were as low as the standards of government cartography are high. To this end he developed the department of "New Maps," aiming to present in it critical reviews of the most important current maps. Akin to this activity was his organization of the exhibit of foreign wall maps and atlases, which circulated among various educational institutions and helped to call the attention of teachers to the effectiveness of these important adjuncts of the text-book.

It is difficult to compress within reasonable limits even an outline of the service he has rendered the Society. It is perhaps enough to conclude that he has been one of the educational factors of the present age of rapid geographical development and has made contributions of lasting importance.

NORTH AMERICA

Our Fur Seals. Two papers on this subject were read at the meeting of the American Association for the Advancement of Science in San Francisco in August last. George Archibald Clark of Stanford University, discussing "Conservation and Utilization of Our Fur Seals," said that the seal herd, which has yielded $26,000,000 to the United States treasury since the transference from Russia in 1867, is now reduced to one-tenth its original size owing to indiscriminate hunting in the open sea of female seals and their offspring. As is well known, pelagic hunting was forbidden by law, and Congress in 1912 also suspended land-sealing, which has involved an annual loss of $500,000 and is detrimental to the seal herd through the overstock of males. The inability of the Treasury Department and later of the Department of Commerce to deal effectively with the problem had been demonstrated. He urged that the management of the seal herd be transferred to the Department of Agriculture, which has experts and facilities necessary to deal with the matter. Mr. W. H. Osgood of the U. S. Biological Survey said in his paper that the fur seals on the Pribilof Islands in 1914 numbered 295,000 seals, of which 93,250 were breeding females. This is an increase of nearly 40 per cent. in two years. It is reasonable to hope that with proper management a nearly or quite complete regeneration of the herd may be effected.

Vulcanism in the Yukon Basin. While Quaternary lavas have been recognized in several localities within the Yukon Basin the most recent vulcanism yet recorded is that first noted, in 1883, by Schwatka, who made observations on the ash deposits of the Lewes River, subsequently defined by the successive studies of Dawson, Hayes, Brooks, and Capps. Mr. Stephen R. Capps (An Ancient Volcanic Eruption in the Upper Yukon Basin, *U. S. Geol. Surv. Prof. Paper 95-D*, pp. 59-64) estimates the area still appreciably affected at 140,000 square miles and the volume of ejected material at about 10 cubic miles, thus placing the occurrence in a category with such classic eruptions as those of Krakatoa (1883) and Katmai (1912). Over large areas the ash appears as a remarkably uniform white layer, entirely sympathetic with the present topography. Apart from sporadic exceptions, explainable by wind action, the layer is

single and apparently due to one period of eruption and unaccompanied by lava flows. The sudden and rapid thickening of the deposit to a maximum of 200-400 inches towards the northern border of the St. Elias Mountains locates the source with considerable certainty. The actual vent is not improbably in a small crater recently observed in a glacial cirque four miles north-northeast of Mt. Natazhat. From this locus, and indicating west and south winds during the eruptive period, the ash spread over an extensive area to the east and north. The recency of the eruption is proved by physiographic and botanical data. The rivers have not had time to lower their beds appreciably since the deposition of the ash, and over large tracts the ubiquitous tundra moss has not yet secured a foothold. Hayes gives an actual time limit in his observations on the Klutlan Glacier. The glacier surface, now ash-free save in the terminal moraine, represents a movement requiring at least some hundreds of years. Capps, applying his determinations on the rate of peat growth to accumulations upon the ash, places the date at approximately 1,400 years ago.

Miss Jobe's 1915 Expedition to the Canadian Rockies. During July and August Miss Mary L. Jobe again made an expedition to the "Mt. Kitchi" region, which she described in the July *Bulletin* of the Society (Vol. 47, 1915, pp. 481-497, with map, 1:300,000). Accompanied by two guides and one woman and three men companions she followed the same route as on her first expedition from the Grand Trunk Pacific Railway to "Crescent Lake Pass." Thence a new route, on the divide via Sheep Creek Pass and a pass to the Porcupine, was followed to the northeast base of "Mt. Kitchi." Two attempts to climb the peak were unsuccessful, although on the second an altitude within 200 feet of the top was reached. From "Mt. Kitchi" the party continued north to Jarvis Pass, Mt. Ida and the head of the Wapiti River, traversing in part unmapped territory. The return route via Sheep Creek, the Muddy Water, Grand Cache, the Sulphur and Big Smoky Rivers also in part crossed untraveled areas. Bearings were taken from numerous higher points and detailed observations were made of the region west of Mt. Ida and at the head of the Wapiti.

The Preservation of American Wild Life. Dr. W. T. Hornaday lectured on this topic in Albuquerque, N. M., on October 19, under the auspices of the University of New Mexico, the Albuquerque Game Protective Association, and the U. S. Forest Service. On his initiative a bill will be introduced at the next session of Congress authorizing the Secretary of Agriculture to take over those parts of the national forests that are not adapted for other purposes and establish in them game sanctuaries where game will be bred and set free from time to time over a period of several decades. Dr. Hornaday is confident that, by this method, American game can be preserved.

A Tree Calendar for the Eastern United States. Mr. George N. Lamb of the U. S. Forest Service has prepared an important chart, or calendar, which shows, for the common trees of the eastern United States, the dates of leafing, flowering, "in foliage," seed ripening, seed falling, and leaf falling (*Monthly Weather Rev., Suppl. No. 2*, 1915). The chart is the result of a compilation of data obtained by observers of the Forest Service and also by individuals working alone. The major activities of plants indicate clearly the advance of the season, for these activities depend upon the interaction of a number of weather elements, e. g., temperature, precipitation, humidity, and evaporation. Trees, being the most conspicuous plants and living for many years, lend themselves to phenological observations. There is thus a large body of available material for study along these lines. The tree calendar will be useful to botanists, especially foresters, and to meteorologists, and will also have interest for intelligent observers of plant growth. The botanical range of the various trees is given, and a bibliography is included. Copies of this chart might well be framed and hung on the walls of our schools. Interest in outdoor observation would certainly be stimulated by this means, and comparative observations, made each year by the scholars, of the critical stages of tree development, might well be recorded and kept on file with the chart. The Weather Bureau is doing good work in publishing such a contribution. R. DEC. WARD.

Water Power in the Cascades. The U. S. Geological Survey in coöperation with the Washington State Board of Geological Survey has completed its survey of the water resources of this area (F. F. Henshaw and G. L. Parker: Water Powers of the Cascade Range, Part II, *U. S. Geol. Surv. Water-Supply Paper 313*). This report deals chiefly with the drainage basins of the Cowlitz, Nisqually, Puyallup, White, Green, and Cedar Rivers. The streams of the Cascades have the requisite characteristics for the successful development of water power, viz., steep gradient, abundant water, and comparatively uniform flow. The enormous resources of timber, metals, and lands as yet undeveloped will make the water power of this region very valuable.

The First Year of the Panama Canal. The *Canal Record* (end of August, 1915) analyzes the business of the Panama Canal for the first year of its commercial operation ending on August 14, 1915. During the year 1,317 vessels of 4,596,444 net tonnage passed through the canal. The number of vessels passing from the Pacific to the Atlantic was 661, while 656 vessels passed from the Atlantic to the Pacific. The tolls earned during the year amounted to $5,216,149. The total tonnage of the principal commodities passing through the canal up to July 1, 1915, was as follows: nitrates, 651,948; sugar, 298,864; coal, 286,564; refined petroleum, 252,428; wheat, 230,222; iron and steel manufactures, 202,202; iron ore, 86,104; raw cotton, 48,846; canned goods, 46,998; cacao, 26,928.

Vessels of fifteen nations passed through the canal: American vessels, 481; British, 464; Norwegian, 41; Chilean, 35; Danish, 24; Swedish, 18; and the Dutch, Japanese, Russian, Peruvian, French, Honduran, Italian, Nicaraguan, and Panamanian marine made up the remainder.

About four and one-half times as much tonnage went through the Suez Canal in 1914 as went through the Panama Canal during the first year of its operation. The number of ships using the Suez Canal was about three and two-fifth times as many as used the Panama Canal. The total receipts at Suez were four and five-eighth times the amount of tolls earned by the Panama Canal during its first year.

Suspension of Traffic in the Panama Canal. A serious slide occurred in the canal at the Gaillard Cut (formerly called the Culebra Cut) on September 5 and another on September 18 north of Gold Hill on the east bank. The mass almost entirely filled the channel so that the earth showed above the water where ships ordinarily pass. It was of course necessary to suspend traffic. By the end of December, however, a channel had been dredged large enough to admit of large vessels. According to the "Official Handbook of the Panama Canal, 1915" (p. 46), the slides in the Gaillard Cut up to February 1, 1915, have required 35,158,225 cubic yards of additional excavation. To that date the total excavation from the cut had been 117,077,044 cubic yards. Gaillard Cut forms the passageway between the opposite slopes of the continental divide. It is 8 miles long, 300 feet wide at the bottom and from 45 to 65 feet in depth. The great depth of the cut is responsible for the magnitude of the slides, which are breaks in the banks due to the pressure of the material.

SOUTH AMERICA

Condition of the Pan-American Railroad between Buenos Aires and Lima. The well-known project of a continuous railroad system connecting North and South America (cf. reports of the Intercontinental Railway Commission, 4 vols., with 3 map cases, Washington, 1895-98), while not being carried out as a unit undertaking, is approaching realization through the normal development of the railroad systems in the various countries concerned. A note in *Weltwirtschaft* for October, 1915 (p. 146), calls attention to the near state of completion of the line between Buenos Aires, Argentina, and Lima, Peru. Of the whole distance of 2,690 miles, 1,904 miles, or 70 per cent., are completed, and 282 miles are under construction; of the remaining 504 miles, 62 are surveyed and 442 not yet surveyed. The condition of the line, proceeding from south to north, is as follows: Buenos Aires to La Quiaca, on the Argentine-Bolivian boundary, completed, 1,088 miles; La Quiaca to Tupiza, surveyed, 62 miles; Tupiza to Uyuni, under construction, 127 miles; Uyuni via Oruro and Viacha to Guaqui, near the Peruvian-Bolivian frontier, completed, 360 miles; Guaqui to Puno, reconnaissance survey, 99 miles; Puno to Cuzco, completed, 238 miles; Cuzco to Ayacucho, unsurveyed, except for a short section beyond Cuzco, 340 miles; Ayacucho to Huancayo, under construction, 162 miles; Huancayo, to Lima, completed, 214 miles. Lima is not strictly on the intercontinental line, which passes through Oroya, 128 miles inland from Lima. A northerly continuation is already completed to Cerro de Pasco, 83 miles beyond Oroya.

EUROPE

Discovery of a Substitute for Chilean Nitrate of Soda in Germany. A pamphlet recently issued by the German government announced that agriculture in Germany would not suffer from the inability at present to procure Chilean nitrate of soda, because a satisfactory substitute for this fertilizing element had been discovered. The announcement seems to have been based upon Professor Gerlach's report to the German Agricultural Society of Berlin, on September 18, of the discovery that both sulphate of ammonia and cyanimide will supply a satisfactory substitute for nitrate of soda. Experiments had shown, he said, that sulphate of ammonia produces on an average 89

per cent. of the effect of nitrate of soda, and cyanimide 75 per cent. He estimated the production of cyanimide in German factories at 120,000 tons yearly. German farmers, he added, must use nitrogen fertilizers liberally since it returns six-fold its weight in highly digestible albumens.

PHYSICAL GEOGRAPHY

Truncation of Spur Ends by Glacial Erosion. Mr. P. G. Morgan, director of the Geological Survey of New Zealand, calls attention to the following early recognition, in 1866, of the truncation of spur ends in valleys formerly occupied by glaciers. The extract is from an article "On the Formation of Lake-Basins in New Zealand," by W. T. Locke-Travers, in the *Quarterly Journal of the Geological Society* of London, Vol. 22, 1867, p. 258:

"I will now mention the facts observed by me in the valleys of the Dillon and Clarence, as these valleys present features of exceeding interest in connection with former glacial action. As a general rule in this country [New Zealand] in valleys which have never been occupied by glaciers, the spurs of the ranges on each side interlock; whilst in those which have been occupied by glaciers we constantly find the points of the spurs on one side or other of the valley cut off, the faces of the spurs then being Λ-shaped, and rising at a very steep angle. I have observed the latter feature to obtain in all the valleys in which I have found old moraines, and I think it may be a good guide in determining the longitudinal extent of former glacier action."

Mr. Morgan adds that Travers subsequently wrote several other papers dealing with glaciation in New Zealand (see *Trans. New Zealand Inst.*), but I do not think he ever repeated the lucid statement quoted above; much less did he enlarge on it.

W. M. DAVIS.

Torrents and Floods. Geographers will find an interesting account of the work of torrents and floods, with citations from many sources, in an important geological work entitled "Formation of Coal Beds," by J. J. Stevenson, originally printed in the *Proceedings of the American Philosophical Society* of Philadelphia for 1911, 1912, and 1913, and now issued as a separate volume of 530 pages. The protective effect of vegetation against erosion is illustrated by examples from the White Mountains, the southern Appalachians, France, and elsewhere. River floods are discussed with especial reference to their power of uprooting forests, and with the conclusion that no floods are strong enough to uproot trees, except where they are undermined along a river bank. The source and distribution of driftwood are described, especially on Arctic shores. Peat deposits are treated in much detail, but rather from a geographical than from a botanical point of view. All these and many other matters are considered in order to obtain a present-day observational basis for the explanation of coal deposits. The opinion reached is that "coal beds and the associated rocks are of land origin; the detrital deposits are those made by flooding waters on wide-spreading plains; the coal beds, in all essential features, bear remarkable resemblance to peat deposits" (p. 506).

W. M. DAVIS.

Recent Studies of Atmospheric Radiation. Dr. Anders Ångström of Upsala was a member of the Smithsonian Astrophysical Observatory expedition which, in 1912 and 1913, in Algeria and in California, made observations of the radiation of the sun. Dr. Ångström's report appears as Vol. 65, No. 3, of the *Smithsonian Miscellaneous Collections* (1915). The author finds, among other results, that the variations of the total temperature of the atmosphere are at low levels (below 4,500 meters), principally caused by variations in temperature and humidity, and that the total radiation from the atmosphere is nearly proportional to the fourth power of the temperature at the place of observation. An increase in the water-vapor content of the atmosphere increases its radiation, and an increase in the water-vapor pressure causes a decrease in the effective radiation from the earth to every point of the sky. There is no evidence of maxima or minima of atmospheric radiation during the night that cannot be explained by the influence of the conditions of temperature and humidity. Daytime radiation seems to be subject to the same laws that hold for nocturnal radiation. The effect of clouds is very variable, depending upon their altitude and their density. Nocturnal radiation was reduced by the Katmai dust by less than 3 per cent. It appears, therefore, that the effect of haze upon the effective radiation to the sky is almost inappreciable when no clouds or fog are formed.

R. DEC. WARD.

Sunspots and Rainfall. The question of the relation of sunspots and rainfall is considered by Dr. Gilbert T. Walker, Director-General of Indian Observatories, in Vol. 21, Part 10, of the *Memoirs of the Indian Meteorological Department*. The data of

annual rainfalls at isolated, representative stations all over the world are examined for periods which, in general, do not go back of 1850. The results are presented in tabular form and are also charted, the coefficients being given to the nearest .05. To quote the author, the impression left by an examination of the chart "may be one of disappointment at the comparative insignificance and inconsistency of the results." It appears that the coefficient of rainfall with sunspots is not, in general, much larger than would result from chance. Where the coefficients have an appreciable tendency towards uniformity, a real relationship may be inferred. This relationship seems real in the cases of the Nile and India. The clearest case is South America. Below lat. 30° S. the rainfall is deficient when sunspots are numerous. A full discussion of the problem is to be postponed by the author until a later date. R. DEC. WARD.

Volcanic Dust and Climatic Variations. Mr. Henryk Arctowski's important studies of temperature variations and their correlations are being continued, with further interesting results. The most recent paper (*Annals N. Y. Acad. Sci.*, Vol. 26, 1915, June 21, pp. 149-174) takes up the question of the possible effect of volcanic dust upon terrestrial temperatures, a subject to which W. J. Humphreys, C. G. Abbot, F. E. Fowle, and H. H. Kimball, in this country, have lately paid attention. The problem was to ascertain, if possible, whether temperature variations are due to terrestrial causes, as in the case of volcanic dust veils, or to cosmical causes. The temperatures at a considerable number of stations are plotted for the years before, after, and also including, the Krakatoa, Mont Pelé, and Katmai eruptions. Curves are drawn showing the world's mean temperatures and the variation of frequency of volcanic eruptions (ten-yearly totals). The discussion of the relation of sunspots and atmospheric temperature is considered briefly. The author concludes that the Krakatoa dust veil very greatly affected temperature, but that the eruptions of 1902 and the Katmai eruption of 1912 had a very slight effect, if any, upon the mean annual temperatures. The "pleionian" variations of temperature have nothing in common with the presence or absence of dust veils. There is a presumption in favor of a correlation between "pleionian" and "macropleionian" (long range) variations of temperature and volcanic eruptions. As yet, however, there is difficulty in imagining how such a correlation could be explained.
R. DEC. WARD.

GEOGRAPHICAL NEWS

A New Series of Regional Geographies. Under the editorship of Professor Vidal de la Blache, the dean of French geographers and a recent Charles P. Daly medalist of the Society, a new series of regional geographies is to appear bearing the imprint of Armand Colin, Paris. The series, which will be entitled "Géographie Universelle" and comprise twelve volumes, will embody the most advanced methods in the presentation of regional geography. Unlike the classical prototype from which it derives its name, Reclus' survey of world geography in nineteen volumes, it will be written by a number of specialists. Although the detailed list is not yet available, the following contributors may be mentioned: Henri Baulig, North America or the United States; Albert Demangeon, the British Isles; Augustin Bernard, North and West Africa; and Jean Brunhes, the Mediterranean and the Mediterranean countries of Europe. Publication was to begin, it was hoped before the war broke out, toward the end of 1915.

Change of Title of "Popular Science Monthly." Beginning with the October number, *Popular Science Monthly* has changed its title to *The Scientific Monthly*. Its character, editorial management, and typographical appearance will remain the same. The change has interrupted the final volume (87) of *Popular Science Monthly*, which would ordinarily have extended from July to December. Thus at least one series of articles continues in the new volume. The October number of *The Scientific Monthly* is designated Vol. 1, No. 1. The Science Press continues to be the publisher. The old title has been assumed by a—literally—popular magazine of applied science heretofore called *World's Advance* and edited by a former managing editor of the *Scientific American*.

A Memorial of Professor Tarr. A granite boulder has been placed on the campus of Cornell University as a memorial of the late R. S. Tarr, professor of geology and physical geography at the university from 1892 to 1912. A bronze tablet will be set into the boulder inscribed: "Ralph Stockman Tarr, 1864-1912. Scientist—Writer—Teacher. This boulder, a relic of the Ice Age, symbolic of his research in glacial geology and of the enduring value of his work, is placed here as a memorial of their friend and adviser by his students."

Personal

Marquis Cappelli has resigned the presidency of the Royal Geographical Society of Italy.

Professor Henry C. Cowles, of the University of Chicago, lectured before the Geographic Society of Chicago, on October 8, on "Romance and Reality from the Mississippi Bottom Lands."

Professor Elizabeth F. Fisher of Wellesley College is giving two courses of lectures in the Teachers' School of Science (Lowell courses in the university extension), Boston, one on "The Physical Geography of the Lands" based on concrete examples, attended by sixty students, and the other on "The Economic and Historical Geography of Greater Boston," attended by eighty students.

Dr. W. T. Grenfell will spend the winter in the United States and Canada making a transcontinental lecture tour to raise funds for his Deep-Sea Mission in Labrador.

Dr. Sven Hedin has been elected a corresponding member of the Royal Academy of Sciences in Vienna.

Dr. Ellsworth Huntington has been awarded the Elisha Kent Kane medal of the Geographical Society of Philadelphia. After the presentation, on November 3, Dr. Huntington lectured before the society on "Climate, Weather, and Daily Life."

Professor Theodor Koch-Grünberg has been appointed scientific director of the Museum für Länder- und Völkerkunde in Stuttgart.

Obituary

Colonel Sir Claude M. Macdonald died in England of heart failure on September 10, aged 63. While best known as a diplomatist, he did geographical work of distinct value, when, in 1887-88, he made a voyage up the Benue tributary of the Niger, whose upper course and affluents were imperfectly known. He was the first to map the Mayo Kebbi, the northeastern branch of the Benue, which he ascended in a small steamer. He thus revealed the navigable stretch of that river; but it was reserved for the French explorer Captain Lenfant later to trace the remarkable water connection which the Mayo Kebbi forms between the Benue basin and the basin of Lake Tchad.

Dr. Charles Frederick Holder, the naturalist and author, known for his books on marine zoölogy and related subjects, died at his home in Pasadena, Cal., on October 11, aged 64 years. He was a voluminous author. Among his works were Elements of Zoölogy, 1885; Stories of Animal Life, 1900; Game Fishes of the United States, 1913; Game Fishes of the World, 1913.

Dr. Emil Rudolph, honorary professor of geography in the University of Strassburg, has died at the age of 61 years.

Professor Paul Stange, geographer in the government service of Chile (1890-1898), has died in Germany, aged 54 years. While in Chile he was associated with the explorations of H. Steffen and P. Krüger in the Chile-Argentine boundary region of the Patagonian Andes. He published in 1914 his "Landeskunde von Chile," reviewed in the October *Bulletin* of the Society (Vol. 47, 1915, p. 783).

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

Explanatory Note

Beginning with the present number, a change is made in the arrangement of the bibliographical section. In the *Bulletin of the American Geographical Society* the publications listed each month were divided into four sections, mainly according to physical form, and each section was then subdivided by regions or subjects, whereas in *The Geographical Review* all publications will be listed under one department, in which the regional and subject classification will be the main principle of subdivision.

Under the caption "Brazil," for example, will be found together all the references on that region, whether reviews or titles of books, papers, or maps. Within each regional or subject division come: first, reviews of books, papers, and maps; second, titles of books and papers; and, third, titles of maps; the items within the first and second groups being listed alphabetically according to author or, where anonymous, according to the characteristic word of the title. The map titles constituting the third group follow no special arrangement, but they are distinguished by a different style of type. Groups two and three, while mainly consisting of titles only, are occasionally supplemented by short comment. The size of books is given in inches to the nearest half inch.

With regard to the bibliographical department in general, it should be understood that the publications listed are not necessarily all distinctively geographical in treatment, though all are to be of geographical interest or to contain material for the geographer.

A synopsis of the scheme of regional and subject classification is given below. Although the logical sequence would be first to take up the subdivisions of general geography and then those of regional geography, it has been thought wiser to begin with the regional classification in view of the greater general interest in this phase of geography and the greater number of publications dealing with it. Similarly, the regional takes precedence over the general classification. A paper on the climate of Brazil would thus be listed under "Brazil" and not under "Meteorology and Climatology."

The classification of general geography aims to subdivide its main divisions into their constituent parts. The subjects included under the headings used will appear from the explanatory column of the synopsis. Only publications dealing with the principles of geography, and not with their application to definite regions, are listed in this section, as, for example, papers on the population density of industrial districts or on desert vegetation.

In the regional classification the thought has been to create divisions that are broadly homogeneous and to adjust the size of each division to its importance in geographical literature. In some cases this has led to the grouping of several countries together; in others to the retention of a single country as a division by itself; and in still others, as in the case of the United States and Canada, for obvious reasons, to the subdivision of a country into smaller units. Although political areas have on the whole been the units used, in some cases, as for Africa and India, it has been necessary partly to disregard these in order not to break up related regions. The divisions are enumerated as far as possible in their natural order, beginning with the western hemisphere, so that contiguous areas may follow one another.

About fifty divisions have been established. They are enumerated in the synopsis below and outlined on the adjoining map of the world in two hemispheres, on which the numbers correspond with those in the synopsis. The boundaries on the map refer only to the land areas which they enclose. Areas included in a division but not expressed in the heading used for it, such as detached islands, are indicated in the explanatory column of the synopsis.

All publications are classified according to the division with which they predominantly deal. A map of Europe and the Near East would thus be listed under "Europe;" a paper on the climatic basis of vegetational distribution, under "Phytogeography and Zoögeography."

All divisions of the classification will not necessarily be represented in each issue.

SYNOPSIS OF CLASSIFICATION

Regional Geography

Titles of Headings	*Other Areas Included*
NORTH AMERICA	
General	
1 Alaska	
Canada	
General	
2 Yukon, Northwest Territories, British Columbia	Southampton I., Coats I.
3 Alberta, Saskatchewan, Manitoba	
4 Ontario, Quebec	Labrador coast, Mansel I.
5 Maritime Provinces, Newfoundland	

Titles of Headings	*Other Areas Included*
NORTH AMERICA (continued)	
United States	
General	
6 North Atlantic States	
7 South Atlantic States	
8 North-Central States	
9 South-Central States	
10 Western States	
11 Mexico and Central America	Panama; Gaudalupe I., Revilla Gigedo Is., Clipperton I.
12 West Indies	Bermuda; Curaçao, Aruba, Buenayre, Trinidad, but not Venezuelan coastal islands

Titles of Headings	*Other Areas Included*
SOUTH AMERICA	
General	
13 The Guianas, Venezuela, Colombia	Cocos I., Malpelo I.
14 Ecuador, Peru, Bolivia	Galápagos Is.
15 Brazil	Fernando Noronha I., St. Paul I., Trinidad I.
16 Paraguay, Uruguay, Argentina, Chile	San Ambrosio I., Juan Fernandez I., Falkland Is.
EUROPE	
General	
17 British Isles	Channel Is.
18 The Low Countries, Luxemburg	
19 France	
20 Switzerland, or the Alps	
21 Germany	
22 Scandinavia, including Finland	Iceland, Faroe Is.
23 Russia	
24 Austria-Hungary	
25 Balkan States, including Rumania	
26 Italy	Malta
27 Spain, Portugal	Azores
AFRICA	
General	
28 Atlas Region	Madeira, Canary Is.
29 Sahara, including Egypt	
30 Sudan and Upper Guinea	Cape Verde Is., Fernando Po
31 Congo Basin and Lower Guinea	S. Thomé and Principe Is., Annobon I.
32 East Africa	Socotra I.
33 South Africa	Ascension I., St. Helena, Tristan da Cunha, Gough I.
34 Madagascar and Adjacent Islands	Comoro Is., Amirante Is., Seychelles Is., Mascarene Is.
ASIA	
General	
35 Turkey in Asia, Arabia, Caucasia, Iran	Cyprus (Iran=Persia, Afghanistan, Baluchistan)
36 Russian Central Asia	=General Government of the Steppes, General Government Turkestan, Bokhara, Khiva
37 Siberia	
38 Manchuria, Korea, Japan	
39 Mongolia, Chinese Turkestan, Tibet	
40 China	
41 India	Ceylon, Laccadive Is., Maldive Is., Chagos Is.
42 Farther India, including Burma	Andaman Is., Nicobar Is.
43 Malay Archipelago, including the Philippines	Cocos Is.
AUSTRALASIA AND OCEANIA	
General	
44 Australia, New Zealand	Norfolk I., Lord Howe I., Chatham Is., Bounty Is., Antipodes Is., Auckland Is., Campbell I.
45 Melanesia, Micronesia, Polynesia	
POLAR REGIONS	
General	
46 Arctic	American Arctic Archipelago
47 Antarctic	Amsterdam I., St. Paul I., Kerguelen I., Heard I., Crozet Is., Prince Edward Is., Bouvet I., South Georgia, Sandwich Is., Dougherty I., Macquarie I.
OCEANS	
WORLD AS A WHOLE AND LARGER PARTS	

General Geography

Titles of Headings	*Subjects Included*
MATHEMATICAL GEOGRAPHY	
General	
Astronomical Geography	Orientation on the celestial sphere; rotation and revolution; time
Surveying and Geodesy	Navigation; size and shape of the earth
Cartography	Projections; map content; cartometry; globes and relief models
PHYSICAL GEOGRAPHY	
General	
Geophysics	Density; condition of the interior; determination of gravity; terrestrial magnetism; atmospheric electricity
Geology and Geomorphology	Seismology
Hydrography and Oceanography	Potamology; limnology
Meteorology and Climatology	Phenology; aërology
Phytogeography and Zoögeography	
HUMAN GEOGRAPHY	
General	
Anthropology and Ethnology	
Anthropogeography	Population and population density; history of settlement; city geography
Economic Geography	Natural products; agriculture; commerce; transportation
HISTORY OF GEOGRAPHY AND EXPLORATION	Historical geography
EDUCATIONAL GEOGRAPHY	Methodology

NORTH AMERICA

GENERAL

DUNBAR, SEYMOUR. **A History of Travel in America**, showing the development of travel and transportation from the crude methods of the canoe and the dog-sled to the highly organized railway systems of the present, together with a narrative of the human experiences and changing social conditions that accompanied this economic conquest of the continent. Vol. 1: li and 339 pp. Vol. 2: pp. 340-740. Vol. 3: pp. 741-1124. Vol. 4: pp. 1125-1529. Maps, ills., index. The Bobbs-Merrill Co., Indianapolis, 1915. $10 for 4 vols. 9 x 6½.

A somewhat ambitious and, on the whole, successful attempt to unfold an important phase of American history which is peculiarly dependent on geography. The dependence may, however, be called mutual, for neither physical nor human geography can make a bare survey of what is; it must view the surface in its making and the human relations to the earth in their evolution.

The author has attempted in these volumes to interpret travel movements in their deeper social meaning and has introduced a mass of social data whose relation to the main theme is not always obvious.

The style in detail is clear, the use of sources thorough, and the narrative vigorous and interesting, though the organization of the material often leaves something to be desired. There are, also, mechanical reasons which throw a certain measure of obscurity on the forward movement of the work.

The first volume brings the story down through a series of first attempts at steamboats. It is thus naturally devoted to matters of a primitive sort, giving a vivid picture of the difficulties of the American wilderness, the making and use of the earliest canoes, barges, and sailing boats, and the transforming of Indian trails into rough roadways.

Volume 2 carries the narrative from Fulton and the *Clermont* through the construction of the National Road and to the final consignment, under Jackson, of parts of the road to the several states. The last chapters of the first volume and the opening

chapters of the second offer a full and fascinating account of primitive steam navigation. Several chapters, making the body of the second volume, deal with the acquirement from Indian owners of routes of travel leading through the old Northwest between the Ohio River and the Great Lakes, also through the Southern States east of the Mississippi. For most readers this section seems overextended and parts of it irrelevant.

The author seeks to give the rough social and domestic background of travel and has a scent for a good story so keen as to lead him now and then to a rather gossipy diffuseness. This tendency is illustrated in Chapter 31. Chapters 34 to 46 make up the third volume. They deal with stage coach travel, with the early canal period, to which are given three full and illuminating chapters, and to the early railroads, which fill the greater part of the volume.

The concluding volume finds its theater between the Mississippi River and the Pacific Ocean, "the overrunning of the West," with further stories of Indian relations, the various routes across the plains and mountains, the Mormon pilgrimage, the "cry of gold," and the consummation of Pacific railroad projects. The closing chapter attempts to sketch, in the light of their meaning, the conditions of today.

As to certain phases of book-making: The preface is rather labored and does not succeed in revealing in any sharp fashion the aim of the work. Volume 1 gives the contents of the fifty-eight chapters of the whole series, but in syllabus form and without distinctive chapter titles. The title of the work is used as running-head on both left and right pages. These conditions of mechanical structure make it impossible to get a bird's-eye view of the subject-matter or to tell readily where one thing ends and another begins.

The same defect in perspicuity characterizes the appendices, thirteen in number, and the final index. This index covers forty-five pages and is evidently made with great and conscientious labor, but follows an analytic method which is doubtless clearer to the author than to the reader, offering, in fact, but an obscure clue to the contents. Who, for example, would think of the word, "Attitude—of White Americans," for considerations of the utmost variety, filling nearly two pages? Again, if a name be sought of some celebrity, the reader must learn that it will be found under the head of "Individuals." Three solid and bewildering pages of titles appear under the head of "Pioneer life of Caucasians."

There is profuse illustration,—some four hundred views, mainly from old cuts and engravings, including some full-page representations in color. Print and paper are attractive, and, despite defects, the work is important and deserving of hearty welcome.

A. P. Brigham.

Alaska

Jones, L. F. **A Study of the Thlingets of Alaska.** 261 pp. Ills., index. Fleming H. Revell Co., New York, 1914. $1.50. 8 x 5½.

Written by a missionary of more than twenty years' experience among the Thlingets, this book is instructive, sane, simple, and clear. The following topics are treated with authoritative data: environment, origin of Alaskans, Thlinget language, family, community, clothing and ornaments, industries, basketry, foods, customs (extinct, waning, and present), mortuary rites, shamanism, totemism, legends, jurisprudence, amusements, morality, diseases, religion, and education.

The Thlingets are coastal and largely insular people. They are sea-faring men whose main food supply comes from the water. Fish "is the most abundant and most easily procured of all foods in Alaska." The chapter entitled "Traits" is particularly analytical. According to Jones the outstanding characteristics of the Thlingets are independence, vanity, sensitiveness (especially noteworthy in personal or property comparisons), jealousy, craftiness, and politeness. The native is not avaricious; on the contrary, he is an extravagant spendthrift. He is childlike in fickleness, undemonstrative before white strangers, but very demonstrative among his own people. He possesses great physical endurance, has intense, though ephemeral, grief, is very affectionate, hospitable, and social. Many natives are sunny and abound with wit and humor. They are expert in powers of detailed observation and in judgment of men.

The chapter on "Totemism" is important. "The totem pole is but one of the many expressions of totemism. Everything the native possesses, in many instances, even his person, carries totemic designs. . . . Totemism is recorded history, genealogy, legend, memorial, commemoration, and art."

Any student of primitive culture or of aboriginal Americans will be profited by reading Mr. Jones's book. Those who are at times discouraged by the slow development of the American Indian will be gratified at the hopeful facts of more noteworthy advancement among the Thlingets.

A. E. Jenks.

BROOKS, A. H. **The Alaskan Mining Industry in 1914.** Map. *U. S. Geol. Surv. Bull. 622*, pp. 15-68. 1915.

BROOKS, A. H. **The Future of Gold Placer Mining in Alaska.** *U. S. Geol. Surv. Bull. 622*, pp. 69-79. 1915.

BROOKS, A. H., AND OTHERS. **Mineral Resources of Alaska: Report on Progress of Investigations in 1914.** 380 pp. Maps, ills., index. *U. S. Geol. Surv. Bull. 622.* 1915.

CANADA

General

STEELE, S. B. **Forty Years in Canada: Reminiscences of the Great North-West, With Some Account of His Service in South Africa.** Edited by M. G. Niblett. xvii and 428 pp. Ills., index. Dodd, Mead & Co., New York, 1915. 8½ x 5½.

In the past forty years a large part of western Canada has been won from the wilderness. Until 1870, or even later, this was a region unknown to the outside world, and, on theoretical grounds, much of it was believed to be entirely unadapted for settlement by white men, because of a too rigorous climate. Some far-seeing Canadian statesmen and business men, however, recognized the future possibilities of western Canada. Consequently, a campaign of development was gradually organized including the building of the Canadian Pacific Railway. This line, though not completed until 1885, blazed the trail for the immigrant. Settlers have continued to pour in, with the result that the former home of the Indian, the trapper, and the buffalo is now the scene of prosperous cities and towns, of grain fields and elevators. The author was identified with the evolution of western Canada. He had no small part in the events which have made the history of Canada. His book will appeal to a wide range of readers, including students of history, geography, anthropology, and sociology. Many detailed accounts are given of the customs, ceremonies, and life of the Indians, and there are numerous descriptions of frontier life in general. AVARD L. BISHOP.

—— **Forest, Fishery, Fur, and Mineral Production. Fifth Census of Canada, 1911: Vol. 5.** 171 pp. [In English and French]. Census and Statistics Offices, Ottawa, 1915.

—— **Geographic Board of Canada: Decisions, July-October, 1915.** 4 pp. Extract from *The Canada Gazette*, Oct. 30, 1915. Ottawa, 1915.

HOOKER, ARTHUR, edit. **Official Proceedings of the 21st International Irrigation Congress Held at Calgary, Alberta, October 5-9, 1914.** 402 pp. Maps, ills., index. Irrigation Branch, Dept. of the Interior, Ottawa, 1915. [Papers on colonization and on agricultural, technical, administrative, and other problems of irrigation in the interested sections of Canada and the United States.]

Alberta, Saskatchewan, Manitoba

DOWLING, D. B. **The Cretaceous Sea in Alberta.** Maps. *Trans. Royal Soc. of Canada*, Series 3, 1915, Vol. 9, Section 4 (Geol. & Biol. Sci.), pp. 27-42.

Explored routes in the lower parts of the drainage area of Churchill and Nelson Rivers, Manitoba and Saskatchewan: geology and geography. 1:1,013,760. Map 58A, to accompany *Geol. Surv. of Canada Memoir No. 30*, by Wm. McInnes. [Ottawa], 1914.

Ontario, Quebec

MILLER, W. G., AND C. W. KNIGHT. **Revision of Pre-Cambrian Classification in Ontario.** Map. *Journ. of Geol.*, Vol. 23, 1915, No. 7, pp. 585-599.

UNITED STATES

General

BLINK, H. **De Vereenigde Staten als industrieland.** Diagrs. *Tijdschr. voor Econ. Geogr.*, Vol. 6, 1915, No. 10, pp. 394-407. The Hague.

D'ESTOURNELLES DE CONSTANT, P. H. B. **America and Her Problems.** xxii and 545 pp. Ill., index. The Macmillan Co., New York, 1915. $2. 8 x 5½.

—— **Roads and Bridges, Construction and Maintenance of, from July 1, 1913, to December 31, 1914.** 64 pp. *U. S. Dept. of Agric. Bull. No. 284.* 1915.

[Set of 11 climatic charts of the United States.] 1:11,875,000. Lowest temperatures ever observed; highest temperatures ever observed; average annual number of days with

precipitation 0.01 inch or more; normal July temperature; normal January temperature; normal annual temperature; mean relative humidity, July, 8 A. M.; mean relative humidity, July, 8 P. M.; mean relative humidity, January, 8 P. M.; mean relative humidity, January, 8 A. M.; normal annual precipitation. Dept. of Agriculture, Washington, [1915].

North Atlantic States

HALE, L. C. **We Discover New England.** Drawings by Walter Hale. 314 pp. Map. Dodd, Mead & Co., New York, 1915. 9 x 6.

NEWLAND, D. H. **The Mining and Quarry Industry of New York State: Report of Operations and Production During 1914.** 88 pp. Index. *New York State Museum Bull. 178.* 1915.

Topographical survey and new street system of the Borough of the Bronx, [New York City], easterly of the Bronx River, [in 44 sheets]. 1:1,800. Topographical Bureau, Board of Public Improvements, New York, 1900.

North-Central States

—— **Chicago, Consular District of, Trade and Agriculture of the, Report for 1914 on the.** 39 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5504. London, 1915.

State of Illinois. 1:500,000. U. S. Geol. Surv., Washington, 1910.

Map of Iowa, issued by the Board of Railroad Commissioners. 1:506,880. Board of Railroad Commissioners, [Des Moines], 1915.

South-Central States

WEGEMANN, C. H. **A Reconnaissance in Palo Pinto County, Texas, With Special Reference to Oil and Gas.** (Contributions to Economic Geology, 1915, Part 2). Maps. *U. S. Geol. Surv. Bull. 621-E*, pp. 51-59.

WEGEMANN, C. H., AND R. W. HOWELL. **The Lawton Oil and Gas Field, Oklahoma.** (Contributions to Economic Geology, 1915, Part 2.) Maps, diagrs. *U. S. Geol. Surv. Bull. 621-G*, pp. 71-85.

Western States

HOUGH, WALTER. **The Hopi Indians.** 265 pp. Ill., index. The Torch Press, Cedar Rapids, Ia., 1915. $1. 8 x 6.

The environment, social life, food, toil, amusements, vital facts, religion, myths, tradition, and history of the Hopi are presented in such a manner that the professional student of peoples is quite as well repaid by reading Dr. Hough's book as is the layman. The chapter of short biographies greatly assists the reader in orienting himself. After reading that chapter one knows that the Hopi are simply every-day fragile vessels, in spite of the idealistic and artistic glaze with which Dr. Hough (like every other author who loves the people he describes) seems of necessity to adorn his wares.

The desert produced the Hopi. "Out of this environment the Hopi has shaped his religious beliefs, whose strenuous appeal is for food and life from the grasping destroyers of nature that whelm him. And in like manner he has drawn from this niggard stretch, his house, his pottery, baskets, clothing, and all the arts [which he possesses]." A water-hole, by misnomer called a "spring," and stunted maize enabled the Hopi to survive. And he has survived—healthful, temperate, lean, and enduring. A run of 130 miles within twenty-four hours is a Hopi accomplishment, though not the Hopi record. In culture also he has endured.

There were once four Spanish missions in Hopiland. About two hundred years ago the padres were pitched pitilessly to death over the precipitous sides of the mesas—and the Hopi are still pagans. On the tops of those high mesas the Hopi woman builds and owns her dwelling. There the man spins, dyes, and weaves. On the desert beneath them, near a tiny water-hole or periodic trickle of irrigating water, men, women, and children share the toil of gardens. With the exception that small flocks of sheep have taken the place of flocks of domestic turkeys, that there is a burro now and then, and that peaches, apricots, and a few other prized vegetal products have been added to the tiny garden, the Hopi still lives, thinks, and feels very much as did his ancestor in the same desert area before Columbus came to America. A. E. JENKS.

JAMES, G. W. **California, Romantic and Beautiful.** xxv and 433 pp. Maps, ills., index. The Page Co., Boston, 1914. $3.50. 7 x 10.

In the foreword the author refers to the genuine love which Californian writers have

borne to the land of their songs. That the author is himself a good Californian no one will doubt: affection and enthusiasm speak from every page, and his peculiar naturalness and exuberance of style—at times almost naïve—are well calculated to imbue the reader with the California atmosphere and spirit. The book is well balanced, dwelling not only upon the wonders of the land and climate and upon the marvelous growth of its cities and industries, but upon the manifest inspiration which the exceptional geographic conditions have furnished to the intellectual and spiritual life of the people.

As in other books of his, so in this one, the author is likely to be suspected of carrying on a bit of surreptitious advertising. Thus in the chapter on the Yosemite Valley he commends the tourist to certain business establishments, while omitting mention of others of equal importance. A curious error puts at naught one of these "boosts." The one picture that accompanies the Yosemite chapter purports to represent Camp Curry, but instead of an attractive, pine-embowered tourist camp, one beholds a "raw" settlement in a sandy desert. F. E. MATTHES.

JAMES, G. W. **The Lake of the Sky: Lake Tahoe.** xiii and 395 pp. Maps, ills., index. The Author, Pasadena, Cal., 1915. $1.50. 5½ x 8½.

A very complete but somewhat overgrown popular "guide" to the Tahoe region, which should prove particularly useful to those who intend to make a long stay at the lake. For those who crave only a long-distance acquaintance it is almost too lengthy and too wordy.

The book's chief merit is that it brings together a variety of information which hitherto has been scattered, almost forgotten. Thus there are chapters on the discovery of Lake Tahoe by Fremont; on the vicissitudes of Fremont's abandoned howitzer; on the emigrant tragedy that gave Donner Lake its name; and on the Indian legends of the region. There is a brief explanation of the lake's geological history, consisting largely of quotations from Lindgren; a long chapter on glacial features taken from Le Conte, and another by that author on the more striking physical properties of the lake: its amazing clearness, its intense blue color, its reputed coldness, and the fact that it never freezes over—matters which are ever likely to be subjects of popular speculation and misconception.

The appendix contains quotations from Mark Twain, Starr King, Le Conte and John Vance Cheney F. E. MATTHES.

GRANT, U. S., AND G. H. CADY. **Preliminary Report on the General and Economic Geology of the Baker District of Eastern Oregon.** Maps, ills. *Mineral Resources of Oregon*, Vol. 1, 1914, No. 6, pp. 129-161. Portland.

PARDEE, J. T., AND D. F. HEWETT. **Geology and Mineral Resources of the Sumpter Quadrangle.** Ills. *Mineral Resources of Oregon*, Vol. 1, 1914, No. 6, pp. 7-128. [Reconnaissance report relating chiefly to the geologic bases of the economic development. The only detailed geologic report on this region, "The Gold Belt of the Blue Mountains of Oregon," by Waldemar Lindgren, 1901, is out of print.]

Point Conception, [Cal.], Sheet North I 10, North America, [International Map of the World]. 1:1,000,000. U. S. Geological Survey, Washington, 1915.

MEXICO AND CENTRAL AMERICA

SAPPER, KARL. **Die Wirkung des Weltkriegs auf das Wirtschaftsleben Guatemalas.** *Weltwirtschaft*, Vol. 5, 1915, No. 7, pp. 135-136. Berlin.

TRELEASE, WILLIAM. **The Agaveae of Guatemala.** Ills. *Trans. Acad. of Sci. of St. Louis*, Vol. 23, 1915, No. 3, pp. 129-152.

WAGNER, M. L. **Die "Costa de Sotavento" in Mexiko.** Ills. *Deutsche Rundscau für Geogr.*, Vol. 37, 1914-15, No. 9, pp. 395-402; No. 10, pp. 452-460; No. 11, pp. 481-490.

WEST INDIES

—— **Dominican Republic, Trade, Commerce, and Navigation of the, Report for 1914 on the.** 23 pp. Maps. *Diplomatic and Consular Repts.*, Ann. Series, No. 5477. London, 1915.

—— **Dominican Republic, The.** Ills. *Bull. Pan Amer. Union*, Vol. 40, 1915, No. 6, pp. 755-770.

—— **St. Thomas and St. Croix, Consular District of, Trade of the, Report for 1914 on the.** 13 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5485. London, 1915. [Recalls the former pre-eminence of St. Thomas as a distributing center for the

West Indies, Central and Caribbean South America, and contrasts with present conditions.]

WALLACE, T. R. **French West Indies: Martinique.** 7 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 28a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

St. Thomas og St. Jan, Dansk Vestindien. 1:70,000. Chart No. 265. Kgl. Sökort-Arkiv, Köbenhavn, 1914.

SOUTH AMERICA

GENERAL

KOEBEL, W. H. **The South Americans.** vii and 366 pp. Map, ills., index. Dodd, Mead & Co., New York, 1915. $3. 9 x 5½.

The author has written a number of books about South America. He has been there, it appears, a number of times and has gone about the continent a good deal. He has seen a good many things and writes matter that is very easy reading. He does not, however, see very far into things and does not succeed in characterizing the people of a continent.

The first third of his book contains many things that the reader will find of interest in connection with its title-subject. The greater part has been "filled in" with kindred matter about minerals, products, animals, plants, railroads, ports, and general locomotion. Essential pictures of the peoples are not found here. The illustrations are fine in choice and execution, and the index is good; but suppose the reader would like to learn something about the Italians and their wheat-raising colonies, which have shifted the economic emphasis of the country from grazing toward agriculture, he will find practically nothing. There is more insight in a chapter of De Amici's tiny "In America" than in this whole volume. Who rules these republics? Who votes? What part does the average man take in the government? What is the creole Peruvian, Argentine, or Chilean like? Koebel gives no answer to these questions. We cannot visualize his South Americans. He generalizes without enough study of the facts.

Here is a fair example. After mention of Rio, São Paulo, Bahia, and Pernambuco, he says: "From this it will be seen that Brazil is quite unusually well supplied with large towns" (p. 68). Quite the opposite is true. The figures Mr. Koebel gives show four towns of over 100,000 people each, in a total population of 17,000,000, or one large town to every 4,750,000. But the United States (and Canada, too) have one for every 2,000,000 people, Argentina one for every 2,667,000, the United Kingdom one for every 1,200,000. In all Europe only Russia, Rumania, and Austria-Hungary have fewer than Brazil. But there is some vagueness: possibly he means that an unusual percentage of the Brazilians live in large towns? Equally untrue, for on his own count 1,560,000 Brazilians live in the large cities out of a total population of 17,000,000; but the United States, in 1910, had 20,000,000 in the cities of over 100,000 in a total population of 92,000,000, or 21 per cent. to Brazil's 9 per cent. Apart from this failure to characterize the continent and the people, the book is a good one.

MARK JEFFERSON.

ECUADOR, PERU, BOLIVIA

GODING, F. W. **Ecuador.** 8 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 43a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [An unusually favorable year and excellent market conditions have increased the output and value of cacao, Ecuador's principal export. On the contrary, revolutions in Manabi and Esmeraldas have suppressed agriculture in these provinces and in particular the production of ivory nuts, an export valued at $2,118,030 in 1913 and $61,310 in 1914.]

—— **Iquitos, Trade of, Report for 1914 on the.** 17 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5501. London, 1915. [Iquitos is singularly dependent on the remote outside world. Its food-stuffs are imported from abroad; its business is financed from Europe. The former circumstance is responsible for an increased cultivation on the riparian properties and the latter somewhat modifies the disastrous effects of the present crisis, for, whereas smaller local concerns are permanently ruined, the larger foreign companies are only temporarily embarrassed.]

BRAZIL

HUTCHINSON, L. **Brazil: Rio Grande do Sul, Paraná, and Santa Catharina.** 10 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 40c. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Rio Grande do Sul is

increasing the home production of the two more considerable imports, wheat and wine. The former has increased from 15,000 tons in 1909 to 60,000 tons in 1913.]

Mappa economico do Brazil organisado por ordem do . . . Dr. Pedro de Toledo pelo Alvara José Rodrigues. 1:5,000,000. Accompanies Vol. I, "Relatorio apresantado ao Presidente da Republica dos Estados Unidos do Brazil," pelo Dr. Pedro de Toledo, Officinas da Directoria Geral de Estatistica, Rio de Janeiro, 1911.

Mattas e campos no Brasil, esboço organisado pelo Serviço Geologico e Mineralogico por . . . Dr. Pedro de Toledo. 1:5,000,000. Accompanies "Relatorio apresantado ao Presidente da Republica dos Estados Unidos do Brazil" pelo . . . Dr. Pedro de Toledo, Officinas da Directoria Geral de Estatistica, Rio de Janeiro, 1911.

Paraguay, Uruguay, Argentina, Chile

Hammerton, J. A. **The Real Argentine: Notes and Impressions of a Year in the Argentine and Uruguay.** 453 pp. Ills. Dodd, Mead & Co., New York, 1915. $2.50. 8½ x 6.

"The Real Argentine" is a misleading, or perhaps one had better say, a journalistic title. Out of eighteen chapters on the republic only two are devoted to the provinces as distinguished from the "Port;" but Buenos Aires, great as is the portion of the population it absorbs, is not the Argentine. The author himself recognizes this in his brief notes on the provincial towns, Córdoba and Rosario, of which his almost epigrammatic descriptions are quite admirable. Incidentally, however, the population of Rosario is over 200,000 and not "about 150,000." Also the foundation of the Welsh colony of Chubut dates back fifty, not "some twenty years ago." Even in non-statistical works approximate accuracy is desirable. The book is not agreeable reading. Medicine is seldom accepted with gratitude, and this book is avowedly designed as an antidote to the "glorified advertising pamphlets" that represent a considerable percentage of the current literature on Argentina. Traffic congestion, marble-veneer and stucco buildings, expensive living, indoor and outdoor amusements and amusement places, the weather, social life and hygiene, exaggerated patriotism and business methods, and, it must be admitted, the British colony also, share alike in condemnation. Partial excuse is found in the "youthful spirit" of the country. A study of the geographical factors that have created Buenos Aires would surely lead to more sympathetic treatment. One inevitably recalls Bryce's "South America," a work that Mr. Hammerton, because of the disabilities attendant on the political and social status of the distinguished traveler, has not read save in fragmental translations that have appeared in South American papers. And he ingenuously quotes one or two of these re-translated into English!

—— **Chuquicamata, Procedimiento de explotación en.** (Traducido de *The Engineering and Mining Journal*, 25 de Abril de 1914, Vol. 97, Núm 17.) *Bol. de la Inspección de Geogr. y Minas*, Trim. 2, 1915, pp. 206-213. Santiago.

Silva Narro, Domingo. **El Mineral de Chuquicamata.** *Bol. de la Inspección de Geogr. y Minas*, Trim. 2, 1915, pp. 164-169. Santiago.

EUROPE

General

Herdman, T. **Some Geographical Factors in the Great War.** 71 pp. Maps. A. Brown & Sons, Ltd. London, 1915. 9d. 5 x 7½.

The author is lecturer in geography in the Municipal Training College at Hull, England, and has, therefore, a special interest in the geographical aspects of the world-war. In the space of a few pages he discusses very briefly some of the more obvious physical, economic, and racial aspects of the great contest. Recognizing that the surface features of Europe must exert a controlling influence on the movements of armies, he devotes a chapter to discussing the natural gateways between the hostile countries. Unfortunately, the description of a variety of land-forms in purely empirical terms leaves the reader with a confused and hazy mental picture of the surface features, which will not greatly aid his understanding of the plans of campaign now being unfolded from month to month. A paragraph of simple explanatory description, reinforced by one or two diagrams or good maps, would quadruple the value of this chapter. The maps which do accompany the text are poorly drawn and are of but moderate usefulness. Of real value are the historical references to repeated army movements along the same routes in past wars. Half a dozen pages are given to ocean routes and "sea gates,"

as affecting naval operations. The final chapter on "The Problems of Nationality," shows the difficulties which at the close of the war must confront those who would remake the map of Europe by drawing just and natural boundaries in accordance with the distribution of nationalities. D. W. JOHNSON.

HENKEL, L. **Die politische Karte von Europa in ihrer geschichtlichen Entwicklung.** *Geogr. Anzeiger*, Vol. 16, 1915, No. 10, pp. 289-293. Gotha.

TE LINTUM, C. **De oorlog en de aardrijkskundige studiën.** *Vragen van den Dag*, Vol. 30, 1915, No. 9, pp. 706-718. Amsterdam.

Orographical sketch map of Europe, to illustrate the paper by Vaughan Cornish, D. Sc. 1:15,000,000. *Geogr. Journ.*, May, 1915.

War Map of Europe. 1:4,800,000. W. & A. K. Johnston, Ltd., Edinburgh, [1914].

Conflitto europeo: Carta dell' Europa centrale. 1:3,700,000. A. Vallardi, Milano. 1915.

La conflagrazione europea (carta dell' Europa centrale). 1:5,000,000. A. Vallardi, Milano, 1915.

BRITISH ISLES

WIEDENFELD, KURT. **Liverpool im Welthandel.** *Geogr. Zeitschr.*, Vol. 21, 1915, No. 8, pp. 453-459.

The Hebrides: Sheet North O 29, International Map of Europe. 1:1,000,000. Ordnance Survey, Southampton, 1912.

Scotland—The Highlands: Sheet North O 30, International Map of Europe. 1:1,000,000. Ordnance Survey, Southampton, 1912. [These two sheets are the final editions of the unrevised proofs listed under "Scotland" in the *Bull. Amer. Geogr. Soc.*, Vol. 44, 1912, p. 400. The 100-meter contour has been added.]

Map showing the fishing grounds frequented by British trawlers, to illustrate the paper by Prof. J. Stanley Gardiner, F. R. S. 1:25,000,000. *Geogr. Journ.*, June, 1915.

Sketch maps of the Macclesfield district, to illustrate the paper by B. W. Baker. (a) Geology and physiography; (b) Physical. 1:1,000,000. *Geogr. Journ.*, August, 1915.

THE LOW COUNTRIES, LUXEMBURG

—— **Amsterdam, The Port of: A Short Account of the Docks, Harbour Works, and Trading Establishments of the City of Amsterdam.** 80 pp. Maps, ills. Published by the Municipality of Amsterdam, 1914. 6½ x 9½.

The merchants of the Netherlands are very active and progressive and have the support of a sympathetic and efficient government. The proof of this is found in the successful way in which natural obstacles have been overcome and important seaports made and kept, in answer to the demands of modern traffic. Rotterdam has made herself one of the world's great ports, and Amsterdam, though left somewhat on one side of the great world-highway, still holds a proud place as a warehousing port, with claims of first rank in some commodities still, such as cinchona bark and tobacco.

A brief and well-written account of the port and its advantages is here given. The maps give a very good idea of the dock facilities, of the proposed extension of the docks to the west, and of the North Sea Canal. This canal already has been deepened to give passage to boats of 31-foot draft, and the lock has provision for 46 feet ultimately. J. PAUL GOODE.

ZEEMAN, K. **Moderne geographie van Nederland.** 2nd edit. xii and 331 pp. Maps, ills., index. W. Versluys, Amsterdam, 1914. 9 x 6.

In less than two years it has become necessary to put this work to press a second time, for it immediately found its place as among the standard works on the geography of the Netherlands. The method of the author is commendable in any text of geography; it is indispensable in such a land as the Low Countries where the new links with the ancient diluvium, the artificial with the natural. Zeeman works directly from the physiography of his land to the economic or industrial geography, always a valuable method and here essential. The work is expressly prepared for schools of the *gymnasium* type *(Rijksdagnormaalschool)*, and is immeasurably superior to the course in geography and industry offered at some of our older universities.

SCANDINAVIA, INCLUDING FINLAND

LEACH, H. G. **Scandinavia of the Scandinavians.** x and 332 pp. Ills., index. Charles Scribner's Sons, New York. 1915. 7½ x 5½.

A terse, yet clear compilation of the salient facts about the history, constitution,

military and naval efficiency, social work, and literature of Denmark, Norway, and Sweden. Within about one hundred pages for each country, the average reader will find all the general information necessary. After a brief chapter on the Scandinavians in general, Denmark, Norway, and Sweden are described in the order named. Norway was the first nation to adopt equal suffrage. The national political issue is the language question. The language of the cultivated, a Norwegian Danish, is at grips with the dialect of ninety-five per cent. of the people. The work of the Polar explorers Amundsen, Nansen, Sverdrup, and Stefansson is well described, especially the Norwegian geographical work in Greenland. The work of Sven Hedin, the explorer of Tibet, in arousing his nation to military preparedness receives prominence. A brief chapter is given to Lapland; and the work closes with a description of the mid-summer eve festival at Dalecarlia. The illustrations of Norse scenes and Norse persons of prominence are excellent. DAVID H. BUEL.

GANDOLFI-HORNYOLD, A. **La Norvège et ses pêches maritimes.** *Le Globe*, Vol. 54, 1914-15, Nov.-April, pp. 20-23. Geneva. [Abstract of a lecture.]

Karta över södra Sveriges landformer av Sten de Geer. 1:500,000. Sveriges Geologiska Undersökning, Stockholm, [1913]. [Accompanied by booklet.]

Det Danske Hedeselskab Plantager, Vandings- og Afvandingsanlaeg i Jylland, 1913. 1:333,000. Danske Hedeselskab, Viborg, 1915.

AUSTRIA-HUNGARY

BLINK, H. **De havens van Aquileja, Venetie en Triest naar hun opkomst en historische beteekenis.** Maps. *Tijdschr. voor Econ. Geogr.*, Vol. 6, 1915, No. 10, pp. 369-380. Amsterdam.

HALSTEAD, A. **Austria-Hungary.** 22 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 1b. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Supplements the usual analysis of import and export trade with a discussion of the activities and influence of the official chambers of commerce.]

Carta base pel raggruppamento delle nazionalità nell' I. R. Monarchia e stati limitrofi, by Adriano Colocci. 1:4,000,000. Istituto Geogr. De Agostini, Novara, [1914?].

Panorama delle nostre terre irredente. [2 sheets]: 1, Venezia Tridentina; 2, Venezia Giulia. 1:250,000. A. Vallardi, Milan, [1915].

La frontiera italo-austriaco e territori della 'piu grande Italia.' 1:1,200,000. A. Vallardi, Milan, 1915.

BALKAN STATES, INCLUDING RUMANIA

BALDACCI, A. **Itinerari albanesi del 1896.** Ills. *Boll. Reale Soc. Geogr.*, Vol. 4, 1915, No. 10, pp. 1020-1044. Rome.

BRIQUET, WILLIAM. **Mœurs et coutumes des tribus albanaises.** *Le Globe*, Vol. 54, 1914-15, Nov.-April, pp. 36-47. Geneva. [Abstract of a lecture.]

BRIQUET, WILLIAM. **De la frontière serbe à l'Adriatique: Voyage en Albanie.** *Le Globe*, Vol. 54, 1914-15, Nov.-April, pp. 28-36. Geneva. [Abstract of a lecture.]

—— **Corfu, Trade and Commerce of, Report for 1914 on the.** 24 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5495. London, 1915.

ISCHIRKOFF, ANASTAS. **Ethnographische Karte des Bulgarentums auf der Balkanhalbinsel im Jahre 1912.** Map. *Petermanns Mitt.*, Vol. 61, 1915, Sept., pp. 339-343.

—— **Piræus, the, and District, Trade of, Report for 1914 on the.** 27 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5483. London, 1915.

Historical map of Bulgaria from the beginnings of the Bulgarian Czardom to the present time, 679-1915. [In Bulgarian.] 3 maps: 1, Bulgarian Czardom before the 9th century; 2, Bulgarian Czardom from the 3rd to 13th century; 3 Bulgarian Czardom at the beginning of the 20th century. By K. Antonok. [Approximately 1:7,500,000.] Government Printing Office, Sofia, 1915.

ITALY

BRUNO, ALESSANDRO. **Il transito attraverso i porti italiani del commercio estero con l'Africa.** *L'Africa Ital.*, Vol. 34, 1915, No. 8, pp. 206-216. Naples.

GUARINI, E. **Espansione economica italiana verso l'America latina.** *L'Esploraz. Commerc.*, Vol. 30, 1915, No. 6, pp. 237-242.

—— **Italy, Foreign Trade of, Report for 1914 on the.** 26 pp. *Diplomatic and Consular Repts.* Ann. Series, No. 5491. London, 1915.

La Venezia, le Alpi Carniche e Giulie, by Pio Galli. 1:600,000. A. Vallardi, Milan. [1915].

SPAIN, PORTUGAL

—— **Azores, the, Trade and Commerce of, Report for 1914 on the.** 13 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5492. London, 1915.

GRACEY, W. T. **Seville, Valencia.** 22 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 15c. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Contains a note on the commercial consequence to Valencia of the isolation typical of the Iberian Peninsula.]

MUÑOZ GIL, P. **Memoria anual del Cónsul de Chile en Logroño, correspondiente al año 1914.** *Bol. de Relaciones Exteriores*, No. 56, 1915, pp. 11-29. Santiago, Chile. [The international rice congress held in the current year in the city of Valencia calls attention to the importance of the production of this cereal in Spain. The intensive cultivation produces a yield per hectare of 8,000 to 10,000 kilograms—a figure which no other rice-producing country can approximate.]

Guipúzcoa, [Province of]. 1:200,000. Alberto Martin, Barcelona, [1915].

Lugo, [Province] of. 1:400,000. Alberto Martin, Barcelona, [1915].

AFRICA

GENERAL

HERRERTSON, A. J., AND J. R. HOWARTH, edits. **The Oxford Survey of the British Empire: Africa.** xvi and 547 pp. Maps, ills., index. Oxford University Press (Amer. Branch), New York, 1914. 9 x 6.

The only unity attainable in grouping all British Africa in one volume is political rather than geographical, and even the political aspects of African territories cannot be adequately represented without some reference to *other* Africa. Most of the volumes of this series must labor under this defect. The book affords a source of information about British Africa of the most modern sort by competent hands, has a good index, and much statistical matter. To a geographer the most satisfying chapters are those that treat of the larger African areas, large enough to constitute something like geographical units. Such are Capt. Lyons' "Sudan and Egypt," Sir Harry Johnston's "East Africa and Uganda" and the numerous papers on South Africa by various authors.

Capt. Lyons has used his intimate knowledge of the Nile countries to good advantage. The account of the regimen of the floods is illuminating. In referring to the fertile silt of the river he implies that the waters impounded behind the dam at Assuan lack it, without, I think, definite statement. He gives the density of population in the Delta as 640 to the square mile; of the province Menuf'ieh at the apex of the Delta at 1,600. This is a purely agricultural, country population, though the homes are fearfully huddled to spare the tillable ground. Probably only Japan and China can show such figures. The immediate Nile valley, too, is most densely settled, while the uninhabited deserts hem it in closely on either hand. In spite of Egypt's material progress, most of the people can neither read nor write.

In South Africa the race question acquires prominence from the presence of many whites of many occupations. There they spell their native with a capital N. He outnumbers the whites five to one but does not supply labor enough to develop the country. Yet his presence deters the whites from manual labor. In most of British Africa the whites are simply rulers and rule admirably. Difficulties arise when white men are more numerous, of more social classes, and live somewhat intermingled with the blacks. The Dutch and English have different views on the native problem. In the old Boer states the black man can neither own land nor acquire the franchise. Possibly, a franchise may be given him that will assure him a limited representation.

MARK JEFFERSON.

CUFINO, L. **Lo sviluppo commerciale dell' Africa tropicale in rapporto ai mezzi di trasporto e di communicazione.** *L'Africa Ital.*, Vol. 34, 1915, No. 9, pp. 225-239. Naples.

ATLAS REGION

—— **Morocco, Trade of, Report for 1913 on the.** 70 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5467. London, 1915.

SAHARA, INCLUDING EGYPT

Atlas of Egypt [in Egyptian]. 11 pls. Survey Dept., Cairo, [1913?]. 11 x 10.

SUDAN AND UPPER GUINEA

KOCH, C. W. H. **Die Stämme des Bezirks Molundu in sprachlicher, geschichtlicher und völkerkundlicher Beziehung.** Ills., index. *Baessler-Archiv*, Vol. 3, No. 6, pp. 257-312. B. G. Teubner, Leipzig, 1913. Mk. 5. 13½ x 10.

This monograph completes the third volume of the excellent *Baessler-Archiv*, a series of works of very high character. The very valuable paper deals with the peoples of the forested region in what was the southeastern corner of Kamerun before the enlargement of 1911. After eliminating the recent mixture of population in the region, Koch delimits very successfully the earlier peoples of Sudan and Bantu stock. These outposts of Sudan culture will be found of peculiar interest. Within the Molundu district there are groups somewhat widely parted. One, at the boundary of the forest and grass land in the interior, comprises three tribes known as Kaka, Yangere, and Bokari; the other consists of the Bangandu settlements along the lower reaches of the Bumba River. In all these peoples, so far as examination has been directed upon them, there appears Bantu admixture, both social and somatic; but, on the other hand, the Bantu, even at some distance from these Sudanese centers, show the results of admixture. An abundance of statistical detail is provided for the support of the author's conclusions, and in the linguistic section nineteen numerals and a dozen common words in twenty-six languages afford the means for initial comparison with such well-established standards of African speech as Hausa on one side and Kisuaheli on the other.

WILLIAM CHURCHILL.

MARTY, PAUL. **Les tribus de la Haute Mauritanie.** Ills. *Rescign. Colon.*, Vol. 25, 1915, No. 5, pp. 73-82; No. 6-7, pp. 118-126; No. 8, pp. 136-145.

YERBY, W. J. **British West Africa: Gambia, Gold Coast Colony, Nigeria.** 16 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 67a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Owing to the former extent of German and Austrian commercial interests, the trade of Nigeria for the past year has probably suffered more than that of any other West African colony. Gambia, with a prosperity based almost entirely upon peanut cultivation, is in so prosperous a condition that it has easily withstood the present disruption of trade.]

Afrique occidentale française: carte administrative, télégraphique, postale et des chemins de fer. 1:6,000,000. Accompanies "Annuaire du Gouvernement Général de l'Afrique Occidentale Française, 1913-1914," Paris, 1914.

Sénégal. 1:2,000,000. Accompanies "Annuaire du Gouvernement Général de l'Afrique Occidentale Française, 1913-1914," Paris, 1914.

Guinée. 1:2,000,000. Accompanies "Annuaire du Gouvernement Général de l'Afrique Occidentale Française, 1913-1914," Paris, 1914.

CONGO BASIN AND LOWER GUINEA

—— **Congo, the, Trade of, Report for 1913 on the.** 11 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5493. London, 1915. [The commercial situation of 1913 was dominated by the rubber crisis.]

EAST AFRICA

HAYS, P. C. **British East Africa and Uganda.** 11 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 65a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [The war has cut off the considerable transit trade from German East Africa that usually travels via Lake Victoria and the Uganda railway to Mombasa.]

SOUTH AFRICA

THIELE, E. O. **Further Notes on the Physiography of Portuguese East Africa, between the Zambesi River and the Sabi River.** Map, ills. *Geogr. Journ.*, Vol. 46, 1915, No. 4, pp. 276-286.

ASIA

General

BERNIER, FRANÇOIS. **Travels in the Mogul Empire, A. D. 1656-1668.** Translated on the basis of Irving Brock's version and annotated by Archibald Constable (1891). Second edition, revised by Vincent A. Smith. li and 497 pp. Map, index. Oxford Univ. Press (Amer. Branch), New York, 1914. $1.75. 7½ x 5½.

A second edition of the translation of the well-known French physician, François Bernier, who was the pupil of Gasseudi and lived through the greater part of the seventeenth century. The work consists of a "History of the States of the Great Mogol, during the Great Rebellion, and for five years afterwards;" letters to M. Colbert on the condition of Hindustan; to M. de la Mothe le Vayer, concerning Delhi and Agra; to M. Chapelain, on the Gentiles (Hindus) of Hindustan; and to M. de Merveilles, descriptive of a journey to Cashmere, the "Paradise of the Indies;" and concludes with answers to inquiries about the periodic rains of India, the currents of the sea, the winds in the Indies, and the fertility, beauty, and wealth of the Kingdom of Bengal. The work is remarkable for clearness of style and accuracy of observation. Bernier's maps of the countries through which he traveled show an unusually accurate geographical knowledge for the seventeenth century. DAVID H. BUEL.

HUNTINGTON, ELLSWORTH. **Asia: A Geography Reader.** xii and 344 pp. Maps, illa., index. Rand McNally & Co., Chicago, 1912.

This little book appears to the reviewer more important than any geographic work he has read for years. Its importance lies in the fact that there is an immense need of books designed for our schools that make constant use of sound, modern, geographic principles. None of the textbooks published in America do it more than in occasional spots.

Dr. Huntington has two rare qualifications for his task. In the first place, he knows his Asia. He has lived among Asiatics, often alone, and for years. He has acquired real sympathy with them in spite of the divergence of their habits from his, exactly as Stefansson has come to sympathize with the Eskimos. As the second qualification Dr. Huntington has a distinct literary gift. He can tell his story. Among scientific men this appears to be looked on with suspicion, partly because it is rare, and partly because it is no proof of scientific knowledge. But neither is it disproof. This work is "popular" and "educational," yet what book on Asia reveals as this does the interaction of land and people? I am sure there is none.

Doubtless a critical eye can find errors. One might get the idea from the book, for instance, that the people of India live on bananas that grow for them while they sit in the sun. But such imperfections are bound to occur in all books. They do not characterize Dr. Huntington's book. Geographical science is already in possession of a goodly body of sound scientific principles of which even the educated public has little conception. We need not one but many Huntingtons to make geography known to the reading public, just as astronomy has needed its Flammarions and its Lockyers. MARK JEFFERSON.

VOSBERG-REKOW, —. **Asiatisches Jahrbuch.** Herausgegeben im Auftrage der Deutsch-Asiatischen Gesellschaft von ——. 1914. 369 pp. J. Guttentag, Berlin, 1914. Mk. 7.50. 9½ x 7.

A valuable annual dealing with each political division of Asia, including the Philippines, in relation to its geography, the leading facts of its history, population, government, military systems, money, weights and measures, production, trade, and means of communication. The latest and most reliable statistics available are used.

Asia commerciale e politica. 1:8,000,000. Insets on the scale of 1:30,000,000: Asia politica; agricoltura, pescherie; piante coloniali; industria e commercio. By Guido Cora. 1:8,000,000. Paravia & Co., Turin, [1914]. [Wall map.]

Turkey in Asia, Arabia, Caucasia, Iran

MACALISTER, R. A. S. **The Philistines: Their History and Civilization.** British Academy, London (The Schweich Lectures, 1911). 136 pp. Index. Oxford Univ. Press (Amer. Branch), New York, 1913. $1.20. 9 x 6.

This tract has a double value. To the scanty and vague text of the sacred canon, Professor Macalister has added the records of Egypt and of the Euphrates valley, which more than double our knowledge of the stout race with whom Israel was in

constant and not always successful conflict until the time of David. He gives a translation of the Golénischeff papyrus detailing the adventures of Wen-Amon to the land of the Philistines; this interesting voyage in the Levant, about 1110 B. C., deserves a place among the works of the fathers of geography. The greater value of the work lies in the establishment of the Philistines among the great peoples of early civilization. The author establishes their origin in the Cretan culture which is now coming into our knowledge. He traces them to their position on the eastern littoral of the Mediterranean and to their command of that sea. He points out their kinship with the race of the Troad, against whom the Greeks fought in the Trojan war. Less satisfactorily, yet quite attractively, he suggests their association with the Etruscans, or at least with certain of the predecessors of Aryan folk on the Italian peninsula. There are debatable points in his conclusions; yet, disregarding these matters of ethnology, every geographer should familiarize himself with the voyage of Wen-Amon in this pleasant setting.

TCHOBANIAN, ARCHAG. **The People of Armenia, Their Past, Their Culture, Their Future.** Translated by G. Marcar Gregory. 68 pp. J. M. Dent & Sons, Ltd., London, 1914. 4 x 6. 1s. 6d.

Originally a lecture, this brief record of the achievement of Armenians in world history has the advantage of being presented by a native of the country. In spite of its sketchy character the account points to the strong influence of a mountain home in the growth of a people. In the country's art as in its history, this influence of the land is ever present. Fragments of folk-songs in the text prove this no less than the survival of the race in the midst of recurrent alien invasions. The text is thoroughly instructive. Its brevity is to be deplored.

—— **Kerman, Consular District of, Trade of the, Report for 1913-14 on the.** 22 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5482. London, 1915. [Commerce is apt to suffer somewhat from raids by the Baluchis, who are always ready to take advantage of the administrative weakness of this frontier province.]

—— **Khorasan, Trade of, Report for the Year ending March 20, 1914, on the.** 20 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5481. London, 1915. [Transportation difficulties are shown in a table summarizing the distance, time, freight charges, and modes of conveyance along the various trade routes.]

—— **Muscat, Trade of, Report for 1913-14 on the.** 31 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5473. London, 1915.

Map to illustrate a seventh Journey [in Persia] by Lt. Col. P. M. Sykes, C. M. G., C. I. E. 1:1,000,000. With enlargement of eastern section of main map: Darragaz and the sources of the Atrek. 1:250,000. *Geogr. Journ.*, May, 1915.

MANCHURIA, KOREA, JAPAN

—— **Formosa, Island of, Report for 1914 on the Trade of the.** 26 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5487. London, 1915.

—— **Japan, Trade of, Report for 1914 on the.** 98 pp. *Diplomatic and Consular Repts.*, Ann Series, No. 5503. London, 1915. [The war has produced most serious effects in the rice and silk markets. To retrieve the former, government purchases have been authorized. A similar attempt to force up the price of silk will be more severely criticized, for the silk market is abroad and is of an importance evident from the fact that it normally accounts for 90 per cent. of the total exports.]

KOCH, D. P. **Japans Industrie und der Weltmarkt.** *Weltwirtschaft*, Vol. 5, 1915, No. 7, pp. 129-133. Berlin.

The northern Japanese Alps to illustrate a paper by Rev. Walter Weston. 1:600,000. *Geogr. Journ.*, Sept., 1915.

CHINA

HOSIE, ALEXANDER. **On the Trail of the Opium Poppy: A Narrative of Travel in the Chief Opium-Producing Provinces of China.** Vol. 1: viii and 300 pp. Vol. 2: 308 pp. Map, ills., index. G. Philip & Son, London, 1914. 25s. 9 x 6.

The purpose of this trip was to check up the honesty of the execution of the laws of China suppressing the opium trade. With the import from India wholly subject to British regulation the local production was the only point which called for examination. Prepared opium may be concealed without difficulty; its use is not always easy to detect, the more particularly when it is eaten instead of smoked; but the cultivation of the poppy is a most trustworthy index of the opium traffic, since the plant is forbidden

by the repressive law and its presence in the fields shows laxity or corruption of administration on the part of local officials. Hosie in the season of cultivation traversed the six provinces capable of raising the poppy, Shansi, Shensi, Kansu, Szechuan, Yünnan, and Kueichou. He found that in some places the growth of the poppy had been given up, in others greatly reduced; all this is a part of the greater campaign against opium and will fluctuate with the extirpation of the addiction to that drug.

The author has made several valuable contributions to the knowledge of little-known areas. The six provinces are well known in general, but he left the familiar highways through choice, avoided the railroads and the rivers and picked an uncomfortable way through lanes which might bring under his examination the utmost expanse of rural district. It was uncomfortable journeying, at times it was not without risk, but it has furnished a considerable supply of information upon hamlets and paths which have not before been visited by so competent an observer. This particularly applies to the lateral roads of these provinces. The work will rank as the first record of many lines of communication, with an evaluation of their practicability, and to that extent is a contribution to the itinerary of central China. WILLIAM CHURCHILL.

MAYBON, ALBERT. **La République Chinoise.** xix and 268 pp. A Colin, Paris, 1914. Fr. 3.50. 7½ x 5.

The author is instinct with a lively sympathy for that feature of Chinese life and thought which we may designate its orientalism, that motive power which in any set of circumstances directs the Asiatic mind to a solution which to us is scarcely comprehensible. It is this quality which imparts such lively interest to the narrative and furnishes the requisite skill in the interpretation of men as controlling the events which would control Europeans in far other fashion, and which makes for the great value of this philosophical story of the overthrow of the empire of the Manchus and the establishment of the new republic of China. The key of the situation lies in the measure of two men, Yuan Shih-k'ai and Sun Yat-sen, and each of these is to be regarded only as the representative of the millennial ethics of the Chinese race. It is impossible for any government to exist in China which does not live in full conformity with the ancient system of morals which has been the salvation and at once the torpidity of the Chinese. Dr. Sun failed to meet the moral requirements and was allowed to pass into scheming exile. Yuan is still in the balance; it is impossible as yet to discover if he is to be the leader of his people, but in this volume we have a very careful estimate of his character. WILLIAM CHURCHILL.

SALZMANN, ERICH VON. **Das revolutionäre China.** 171 pp. Maps, ills. D. Reimer (E. Vohsen), Berlin, 1913. Mk. 5. 9½ x 7.

Though superficial, these studies of China in its revolution and counter-revolution are interesting. Captain von Salzmann premises his reports by the assurance that he has been careful to avoid the opinions of the older settled Europeans of the treaty ports. It is something to have divested himself of the flying gossip of the China coast, yet at the same time he has neglected the mature judgment of those men who have devoted long years to the better comprehension of China and who have learned better to evaluate the great Chinese leaders than could be within the power of a casual traveler. Furthermore the author seems to have come but little into contact with the greater figures of the revolution or with the great Chinese administrators who are essaying to apply to the needs of the new situation the education which they have acquired in the Occident. The chief sources of his information seem to have been a handful of German railway engineers and the less important Chinese functionaries with whom they were engaged. This may serve to account for his consistent attitude of somewhat sneering criticism addressed to the American interest in China, almost wholly educational and religious. We regard the volume as a reflection of the official ideas prevalent in Kiauchau, Germany's footprint on Chinese soil. WILLIAM CHURCHILL.

—— **Amoy, Trade of, Report for 1914 on the.** 8 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5490. London, 1915.

—— **Canton, Trade of, Report for 1914 on the.** 14 pp. *Diplomatic and Consular Repts*, Ann. Series, No. 5507. London, 1915. [Floods—the worst on record for 80 years—that occurred in June caused considerable loss of crops and damage to mulberry trees and are said to have left over 1,000,000 people homeless.]

—— **Changsha, Trade of, Report for 1914 on the.** 16 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5489. London, 1915. [Contains a note on the production of antimony. Supplies from northeastern France and from Austria-Hungary are cut off by the war and Mexican and Bolivian mines are shut down, leaving Hunan the only

important source of supply. Productivity of the mines and cheapness of labor have always made the export profitable, and now with antimony regulus risen from £25 to £100 per ton the native mine owners have realized enormous profits.]

—— **Kiungchow, Trade of, Report for 1914 on the.** 12 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5509, London, 1915.

—— **Wuhu, Trade of, Report for 1914 on the.** 12 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5498. London, 1915.

Carte de la Chine Orientale par le Commandant Friguegnon de l'Infanterie Coloniale [in 9 sheets.] 1:2,000,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1908.

Région de Lao Kay à Yun Nan Fou. 1:500,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1903.

Carte du territoire de Quang-Tcheou [in 12 sheets]. 1:25,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1901.

India

Dewar, D. **Birds of the Indian Hills.** 364 pp. Index. John Lane Co., New York, 1915. 8 x 5. [A companion volume to "The Fauna of British India," in which are discussed the birds of the Himalayas, and the common birds of the Nilgiris and of the Palni Hills. The treatment is by climatic and migration groups.]

Farther India, including Burma

Carte de l'Indo-Chine [in 9 sheets]. 1:1,000,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1903.

Carte schématique des communications du Tonkin. 1:500,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1911.

Carte des voies navigables du Tonkin. 1:500,000. [Service Géogr. de l'Indo-Chine, Hanoi], [1915?].

Cartes des communications du Laos [in 5 sheets]. 1:750,000. Service Géogr. de l'Indo Chine, [Hanoi], 1908.

Carte du groupe d'Angkor. 1:25,000. Service Géogr. de l'Indo-Chine, [Hanoi], 1910.

Carte de l'Ile Ke-Bao, levée et dessinée par M. le Lieutenant de Bosredon du Bureau Topographique de l'État-Major des Troupes de l'Indo-Chine. 1:20,000. Bureau Topographique des Troupes de l'Indo-Chine, [Hanoi], 1898.

Carte servant a suivre la marche des typhons ou dépressions signalées par l'Observatoire de Phu-Lien. [1:4,000,000.] Service Géogr. de l'Indo-Chine, [Hanoi], [1910?].

Ile de Poulo Condore. 1:25,000. Service Géogr. de l'Armée, [Paris], 1900.

Malay Archipelago, including the Philippines

Bernard, C. **Verslag van eene reis naar Sumatra's O[ost]-K[ust] en de Padangsche bovenlanden ter bestudeering van de theecultuur.** 95 pp. Map, ills. Dept. van Landbouw, Nijverheid en Handel, Batavia, 1913. Fl. 1.50. 11 x 7½.

With an agreeable narrative style Dr. Bernard has supplied all the more important facts relative to the somewhat recently systematized culture of tea in the eastern and Padang divisions of Sumatra. That the industry has come under intelligent treatment is largely due to the soil investigations conducted by the author at the great experimental gardens in Buitenzorg. He is associated with the colonial department of agriculture as official adviser on tea culture and is therefore in a position to write with commanding authority. Particular interest attaches to this report, because it shows how the soil capable of producing teas of light flavor, as compared with the heavier teas of Ceylon and Assam, is being brought into activity. Tea of a light but delicate flavor which will stand up under transport is always sure of market; accordingly these new orchards may be expected to contribute largly to the assets of Sumatra.

William Churchill.

Topographische kaart der afdeelingen Tegal, Brebes en Pemalang van de residentie Pekalongen [Java] in 2 bladen. 1:100,000. Topogr. Inrichting, The Hague, 1913.

Topographische kaart der afdeelingen Pekalongan en Batang van de residentie Pekalongen [Java] in 1 blad. 1:100,000. Topogr. Inrichting, The Hague, 1913.

Zuidkust Borneo: Barito-rivier van den mond tot Soengai Kween. Met plan van Martapoera-rivier nabij Bandjermasin. 1:50,000. Chart No. 67, Ministerie van Marine, The Hague, 1915.

Noordkust Java: Oostervaarwater er van Soerabaja. 1:75,000. Chart No. 98. Ministerie van Marine, The Hague, 1915.

Vaarwaters en ankerplaatsen op de westkust van Nieuw-Guinea. Blad III, Noord- en Noordoostgedeelte der Golf van Bintoeni. 1:75,000. Chart No. 354. Ministerie van Marine, The Hague, 1915.

Oostkust Halmahera: Weda-baai. 1:150,000. Met plans van de reedes Messa, Patani, Foja en Weda en van Baai Kokka. 1:150,000. Chart No. 390. Ministerie van Marine, The Hague, 1915.

AUSTRALASIA AND OCEANIA

General

TAYLOR, GRIFFITH. **A Geography of Australasia.** (The Oxford Geographies, edited by A. J. Herbertson). 176 pp. Maps, index. Oxford Univ. Press (Amer. Branch), New York, 1914. 40 cents. 8 x 5.

The geology, physiography, and geography of the various regions of Australasia are considered. The control of the inorganic over the organic is described. A history of exploration, industrial development, etc., is also given.

In writing of the gold discoveries, the author points out that "Two isolated goldfields in the South Australian desert (Tarcoola, discovered in 1893, and Arltunga, in 1902) show that there is no reason to despair of the discoveries of further 'Kalgoorlies.'" Mr. Taylor also brings out other future possibilities of Australasia, and the climates and products of its various regions in relation to the corresponding regions of other continents.

There are many maps and other illustrations in black and white. The subjects are treated briefly, concisely, and in a competent and interesting manner.

WILBUR GREELEY BURROUGHS.

ANDREWS, E. C. **The Canbelego, Budgery, and Budgerygar Mines.** Part II of the Cobar Copper and Gold-Field. 121 pp. Maps, ills. *New South Wales Geol. Surv. Mineral Resources No. 18.* Sydney, 1915. [Contains a description, including a historical note of the Mount Bobby mine, for some years the most productive gold mine in New South Wales.]

DANNEVIG, H. C. **Biological Results of the Fishing Experiments Carried on by the F. I. S. "Endeavour," 1909-14.** Vol. 3, Part 7: **The Continental Shelf of the East Coast of Australia,** pp. 339-344. Part 8: **Bass Strait,** pp. 347-353. Dept. of Trade and Customs, Sydney, 1915. [Physiographic discussions based on the hydrographic work of the F. I. S. *Endeavour*, 1909-14.]

—— **Weather Report and Meteorological Abstract, Monthly, Australian.** Mans. Vol. 3, 1912, No. 3, March, pp. 107-154; No. 4, April, pp. 159-204; No. 5, May, pp. 209-254. Commonwealth Bur. of Meteorol., Melbourne, 1914.

Melanesia, Micronesia, Polynesia

CARNE, J. E. **Notes on the Occurrence of Coal, Petroleum, and Copper in Papua.** 116 pp. Map, ills. *Bull. of the Territory of Papua No. 1.* Melbourne, 1913. 10 x 8.

The material contained in this bulletin is a sketch report of the most cursory sort upon three possible mineral resources of Papua, this being the official designation of that southeastern portion of New Guinea which is held as a possession by the Commonwealth of Australia. Prospectors have reported finds of coal, petroleum, and copper, and before the lands could properly be denounced under mineral claims it was necessary for the Australian government to undertake a reconnaissance of the region. In this report it is made clear that surface indications of the three mineral products have been found, but geological examination has failed to establish the possibility of working the discoveries to commercial profit. Carne is inclined to regard the presence of petroliferous earth as a promise that further exploration may disclose commercial deposits and thus link Papua with the oil fields of the Malay Archipelago.

COLWELL, JAMES, edit. **A Century in the Pacific.** Introduction by W. H. Fitchett. One volume—five parts: scientific, sociological, historical, missionary, general. 781 pp. Index. C. H. Kelly, London, 1914. 21s. 9½ x 6½.

Because this work is of the encyclopedic type it is of uneven excellence. The editor assembles within the compass of a single volume no less than twenty-six essays by twenty-five authorities upon special themes. The result is that the objective varies

with each essay and there is quite as much variety in treatment and style. It is inevitable that a large part of the work should be assigned to missionaries, for, at the fringes of civilization, it is only the resident missionary who has the interest in the life of the savage to direct his observation and the skill with the pen which may establish the record. The Protestant mission in the Pacific is accordingly exalted, and, in case of conflict, the Wesleyan mission is set above the older establishment of the London Missionary Society. This appears particularly in the chapter on Samoa. This tiny kingdom has occupied a large place in diplomatic entanglements; it has brought great nations to the edge of war; it has engaged the best efforts of those who would keep the peace of the world. Yet in this chapter we find little but an uninteresting and partisan narrative of the unimportant squabbles between two missionary organizations. The bibliography under a topical arrangement is pretentious but unsatisfactory, many of the standard works on the South Sea being omitted. WILLIAM CHURCHILL.

EDWARDS, CAPT. EDWARD, AND GEORGE HAMILTON. **Voyage of H. M. S. "Pandora" Despatched to Arrest the Mutineers of the "Bounty" in the South Seas, 1790-91.** Being the narratives of ——. With introduction and notes by Basil Thomson. 177 1p. Map, index. F. Edwards, London, 1915. 6s. 9 x 6.

Great credit is due Basil Thomson, than whom none is better qualified, for the republication of these long-inaccessible narratives of grim adventure in the South Sea. The voyage of the *Pandora* is a necessary complement to the story of the mutiny of the *Bounty*. But its interest by no means ceases there. In these brief narratives, particularly in that of the appreciative surgeon, Hamilton, we find the first description of Tutuila, the American possession in Samoa. The introduction with which Mr. Hamilton prefaces the volume is an excellent commentary on the voyage and on its purpose and should serve to revive interest in the *Bounty* and her mutineers. His notes are accurate, as far as they go, but it is to be regretted that he did not see his way clearly to the identification of all the landfalls by the names now standardized.

FISCHER, H. W. **Ethnographica aus Süd- und Südwest-Neu-Guinea.** Ills., bibliogr. pp. 37-145. J. W. VAN NOUHUYS. **Der Bergstamm Pēsēgēm im Innern von Niederländish-Neu-Guinea.** Maps, diagrs., ills. pp. 1-33. Arts 2 and 1 respectively of Livr. 1 of Vol. 7 (Ethnographie) of "Nova Guinea: Résultats de l'expédition scientifique néerlandaise à la Nouvelle-Guinée en 1907 et 1909 sous les auspices de H. A. Lorentz." E. J. Brill, Leiden, 1913. 12½ x 10.

This first instalment of the ethnographical results of the Lorenz expedition in Dutch New Guinea gives us two valuable reports of notably various treatment. The first is the record made by Nouhuys of the mountain tribe of the Pesegem; the second is the carefully elaborated synoptic list of ethnica collected by Fischer in south and southwest New Guinea. The latter will fit immediately into the mass of similar material and will be found of great value to students who make their researches in the dissemination of various objects and designs as establishing the extent of culture planes. The report by Nouhuys is of great narrative interest. No satisfactory results have yet been reached in the attempt to disentangle the interlacing of diverse races in this great island. Provisionally the coast dwellers have been distinguished as Papuans and Melanesians. The latter designation is unsatisfactory, for it is based upon linguistic considerations for which a more satisfactory explanation may be given. The designation Papuan is confessedly artificial and temporary, for it is clear that there is no uniformity of race among the peoples thus noted. The folk of the interior mountains are but just coming into knowledge, and we lack material whereby to assign them to affinity with any of the coast tribes, but probably they will become established as differing among themselves in the mountain habitat and seldom associable with coast dwellers. Nouhuys distinctly states that the Pesegem are not pygmies; therefore they are not to be associated with the pygmy race found in the mountains not far east by the British ornithological expedition. The expedition was in touch with these mountaineers for but a few hours altogether. The report must therefore be regarded as essentially provisional, but it is an excellent record of observation.

WILLIAM CHURCHILL.

SPEISER, FELIX. **Südsee-Urwald Kannibalen: Reise-Eindrücke aus den Neuen Hebriden.** v and 308 pp. Map, ills. R. Voigtländer, Leipzig, 1913. Mk. 8.50. 9 x 7.

The author modestly disclaims for this volume any higher position than that of a collection of impressions of random voyaging. Yet in the paucity of the literature upon Melanesia these sketches are of great value. Speiser traveled quite at random

through the New Hebrides; his southern limit is set at Noumea, the capital of New Calendonia, and to the north he reached the rarely visited island of Ticopia. Most of his voyaging was done from island to island in cutters and, in this lazy drifting, he was able to see many little-visited islands and to hear the story of life on each from the traders and labor bosses who know the savage of the New Hebrides with far more practical information than do the missionaries. The sketches do not pretend to reach a high grade of geographical value, but they are a fresh record of things seen without preconceptions. His record of impressions is vivid and accurate, and his errors of interpretation are unimportant to the casual reader and may readily be corrected by the student acquainted with Melanesian custom. The volume is the most important contribution to the general geography of the New Hebrides which has yet appeared

WORLD AS A WHOLE AND LARGER PARTS

BOERO, J. A. **Geografia de América, adaptada a los nuevos programas de los colegios nacionales y escuelas normales.** 29th edit. iii and 439 pp. Maps, index. Angel Estrada y Cia, Buenos Aires, 1915. 5½ x 8.

This work by an Argentine normal school professor, author of a series of geographies, calls for two comments: it conceives of America properly, as the twofold continent, North and South America; and it treats the United States with real kindness and sympathy. "The United States, which stands forth today as the most prosperous and most active nation in the world, has inherited the practical, enterprising, and persevering spirit of the northern Europeans together with the vastest, richest, and most beautiful territory of all America." Nor is that an isolated passage.

Many maps by W. and A. K. Johnston, which would be better if a little larger and more legible, illustrate the admirably printed book. Of minor details some criticism may be made. Reindeer are not native to North America, nor is the spring and summer temperature of Newfoundland regarded as "delicious." It is not quite orthodox to make the "trade winds from the Atlantic blow against the eastern crests of the Rockies, leaving there a great number of glaciers which feed the great tributaries of the Mississippi;" nor to put "the largest transatlantic ships" on the waters of lake Michigan. It is amusing to read that the climate of British America is so severe that it "limits the forests in the far north to little trees and *reindeer moss!*"

MARK JEFFERSON.

MEIKLEJOHN, J. M. D. **A Short Geography, With the Commercial Highways of the World.** 34th edit. 190 pp. Maps, index. Meiklejohn & Son, London, 1913. 1s. 7½ x 5.

MEIKLEJOHN, J. M. D. **A New Geography on the Comparative Method.** 41st edit., revised. liv and 578 pp. Maps, index. Meiklejohn & Son, London, 1913. 4s 6d. 7½ x 5.

MEIKLEJOHN, J. M. D. **The British Empire: The Geography, Resources, Commerce, Land-ways and Water-ways of the British Dominions Beyond the Seas.** 8th edit. viii and 351 pp. Maps, index. Meiklejohn & Holden, London, 1907. 3s. 7½ x 5. 1913.

MEIKLEJOHN, J. M. D. AND M. J. C. **A School Geography, With Special Reference to Commerce and History.** 9th edit., revised. viii and 416 pp. Maps, index. Meiklejohn & Son, London, 1913. 2s 6d. 7½ x 5½.

Professor Meiklejohn makes a statement in his "A New Geography" which holds good to some extent in all four books. He writes: "The key-note of the whole book is that statement of Humboldt's: 'Only maps that appear empty take a firm hold on the memory;' and I have tried to sketch the outlines [printed in large type] in a few clear and firm strokes, while the learner may select for himself those facts given in the notes [in small type] which may appear to him most interesting." In the small type are given descriptions and details associated with the main subject considered.

To show that his method is good psychology in teaching, Meiklejohn says: "The symbol of association is a spider's web, any point in which may be reached from any other point along the connecting lines. In these subordinate paragraphs my aim has been to introduce as many hooks, burrs, and tentacles as possible, so that something is sure to stick to the memory of even the most careless." In the make-up of these books, however, there is an objection to this small type—it is so small that it strains one's eyes.

The control of the inorganic over the organic is brought out only to a limited extent.

WILBUR GREELEY BURROUGHS.

MORAL MOLINA, ALFONSO DEL. **Geografia general y descriptiva de las partes del mundo.** 464 pp. Maps, ills., index. Librería de los Sucesores de Hernando, Madrid, 1914. 6 pp. 6 x 9½.

A good example of old-fashioned geography, with all and more of the deficiencies of the class. One instance will suffice: The "eastern" region of Peru has some very little towns, Iquitos, Puerto-Bermúdez, Cuzco, and Puno!

SWAINE, G. R. **Environment: A Natural Geography.** 226 pp. Maps, ills., index. Ralph, Holland & Co., London, 1914. 1s. 9d. 7½ x 5.

The author says that the basic principle underlying the teaching of geography is the influence of environment upon man. This little volume is a successful attempt to illustrate this principle, so far as it can be worked out in an elementary book. The author divides the world into four main regions—polar, cool temperate, warm temperate, and hot—and describes the influence of environment upon life conditions, human and otherwise, in smaller regions within the main divisions. For example, there are four chapters in the section on cool temperate regions, dealing respectively with the equable lands, lands with cool winters and low rainfall, the extreme lowlands, and the elevated lands. Again, in the section on the hot regions, there are five chapters containing discussions of rainless deserts, the tropical monsoon lands of Asia, equable hot lowlands, tropical and semi-tropical highlands, and the islands of the Pacific Ocean. In the appendix is a discussion of the causes of the origin and development of towns. A number of small maps show the various natural regions of the continents. There are also illustrations which should serve forcibly to impress youthful readers with matters discussed in the text. AVARD L. BISHOP.

OSBORN, H. F. **Review of the Pleistocene of Europe, Asia, and Northern Africa.** Maps, ills. *Annals New York Acad. Sci.*, Vol. 26, 1915, pp. 215-315.

Hanc quam videtis terrarum orbis tabulam descripsit delineavitque Ricardus de Haldingham, sive de bello dictus A. S. circa MCCC. Published for the proprietor by Edward Stanford, Ltd., London, 1872. [Gift from Dr. E. L. Stevenson of the Hispanic Society.]

Atlas of the world [in Egyptian characters]. 10 double pls. Survey Dept., Cairo. [1913?]

MATHEMATICAL GEOGRAPHY

GENERAL

BLEICHER, HEINRICH. **Statistik.** Vol. 1: **Allgemeines; Physikalische und Bevölkerungs-Statistik.** (Series: Sammlung Göschen.) 148 pp. Index. G. J. Göschen, Berlin, 1915. 90 pfg. 4½ x 6½.

Much suggestive material is herein developed. The method of collecting statistical data is not always so obvious as some are inclined to believe. One striking yet simple statement calls attention to the fact that only when data are gathered according to some well-thought-out and definite plan are they likely to have a real value. The collection of miscellaneous data without classification should not be included under the heading "Statistics."

In formulating a questionnaire all questions should be short and pointed. Questions which require answers that will serve to check up other answers, yet whose real purpose is not apparent to the one reading them, often increase the efficiency of the questionnaire.

One is cautioned against averaging figures of decidedly different weight. Likewise it is dangerous to compare and contrast averages which are generalizations of widely divergent figures. Various simple formulæ are presented as aids to arriving at proper averages. The significance of graphic representation of statistics is strongly emphasized. Several styles of graphs are illustrated. That graphs, to be of value, must be easy to read and easy to interpret becomes almost axiomatic. A general discussion of the method, organization, and technique of statistics, a special section devoted to population statistics and one to physical statistics, i.e. those of the inorganic earth, form the main divisions of the book. E. VAN CLEEF.

SURVEYING AND GEODESY

GRAFF, K. **Grundriss der geographischen Ortsbestimmung aus astronomischen Beobachtungen.** viii and 210 pp. Ills., index. G. J. Göschen, Berlin, 1914. Mk. 8. 9½ x 6½.

The first half of this little treatise on practical astronomy consists of two chapters on (1) the astronomical and trigonometrical principles involved and the manipulation

of tables, and (2) a description of the instruments employed and their use. The second half consists of four chapters on approximate methods for altitude (latitude), time, longitude, and azimuth; more rigorous methods for time correction and latitude; methods of measuring geographical longitude and azimuth; and special methods for determining nautical positions. In appendices are given typical solutions of the different problems which arise and the usual reduction tables and constants.

The author addresses himself particularly to geographers and travelers and his aim has been "to give primary consideration to practical applications, without, however, hesitating to go into the astronomical principles involved wherever he deems it desirable, while, at the same time, reducing the mathematical skeleton to a minimum." The book, though short and condensed, is complete and well written. In order to make it more practical and useful, a chapter might well have been added on the actual field work, outfit, programs of work, care of instruments, etc. JAMES GORDON STEESE.

RAYMOND, W. G. **Plane Surveying for Use in the Classroom and Field.** 589 pp. Maps, ills., index. American Book Co., New York, 1914. $3. 7 x 4½.

A new edition, in pocket form for use in the field, of the author's well-known textbook on surveying. Instruments, their adjustments and corrections, as well as the theory of errors applying to each, with easy working formulæ, are the subjects first taken up. This part has been entirely rewritten for the new edition. The author says that the collimation adjustment for the transit is herein correctly explained for the first time in a textbook.

The book is primarily for the land surveyor, with a discussion of methods, computations, problems, a chapter on the stadia, and a section on the judicial functions of surveyors and other legal aspects in the bearing of surveys upon private property. Topographic surveying receives a general treatment sufficient for the classroom, and the author refers the student to a list of publications for those wishing to follow the methods of the geological and geodetic surveys. City surveying is treated to secure the precision of one in fifty thousand. The measurement of velocities, discharges, and weir flows is treated under hydrographic surveying. A very full chapter deals with mine and underground surveying and mapping.

The meridian, latitude, time, the solar instrument, and public land surveys are discussed, as well as office instruments, including the pantograph, slide rule, and planimeter. The theory of the latter is explained without the use of the calculus.

There is a sectional view of the transit in colors with eighty-one named and numbered parts. The tables at the end appear to cover very well the subjects treated in the book. C. A. SEOANE.

SCHÜCK, A. **Der Kompass.** II: **Sagen von der Erfindung des Kompasses; Magnet, Calamita, Bussole, Kompass; Die Vorgänger des Kompasses.** 57 pp. IIa: **Tafel 47-79 und Verzeichnis derselben.** 30 pp. The author, Hamburg, 1915. 14½ x 11½.

A short review of Part 1, published in 1911, was printed in the *Bulletin of the American Geographical Society* (June, 1915, p. 465). Part 2, which is really the main work, contains a thesis on the origin and development of the mariner's compass, covering fifty-eight large pages and about four hundred additional cuts, grouped into thirty-three plates, with descriptive matter which completes the catalogue begun in Part 1. It is unfortunate that this monumental work, representing so much research, should not have been published in handier form and in good binding.

The author says that no account of the actual invention of the compass has been found, but four stages in its development may be traced: (1) the discovery of an ore having magnetic properties; (2) the discovery that steel or hardened iron can be made magnetic; (3) the discovery that the magnet or magnetized iron possesses the property of indicating a fixed direction, in other words, is pole-seeking; and, (4) the application of this knowledge by the use of a magnetized iron needle as a compass.

References to lodestones and magnetism are found in the traditions and early writings of many countries. The oldest records of the compass refer to China as its origin. The author gives a long account of all records, fables, references, etc., which attribute the compass to the Chinese. He concludes that whatever the Chinese may have known about magnetism, they certainly knew nothing about its practical use in navigation. From his own observations and investigations in the East many years ago, he found that the Chinese, even then, were not using the compass with much success.

The compass tradition in Europe is next discussed. The first mention of it in early writings is traced and the claims of the different nations as to its invention are balanced. The author disposes of the mythical Flavio Gioja of Amalfi and his reputed invention

of the compass in the fourteenth century. He concludes that the polarity of the lodestone or magnetized iron was independently observed in several countries and no one nationality or association can justly claim its complete development. The same may be said of the controversy as to whether the Europeans or the Arabs had priority of invention or use. "The compass is a foundling and owes its existence and its first development certainly to seafaring men and after them to the labors of various instrument-makers."

A philological discussion of the words magnet, calamita, boussole, and compass follows. All these names were variously used to indicate what eventually became the mariner's compass as we know it today. Citations are made from the languages of practically all seafaring peoples, both ancient and modern. The author concludes with a detailed account of the crude instruments which preceded the compass, beginning with the first floating lodestones by means of which polarity was discovered.

The cuts present a most elaborate pictorial history of the subject. Each phase is represented by numerous examples, usually from several different countries, showing the parallel development. By following them chronologically, we may trace the entire history of the compass. For example, as regards the marking of the points: The compass card originated from the old wind-roses, and the earliest cards had only eight points corresponding to the eight principal winds. The points were marked with the initial letters of the names of the winds, the "L" for east being replaced by a cross. The arrow at the north point became intertwined with the "T" *(tramontano)* to develop into the familiar fleur de lis, the old initials were dropped, but the cross at the east point was retained till comparatively modern times. Then the card was reinitialed with the so-called points-of-the-compass designations, east, southeast, etc., instead of the names of the winds. In a similar manner one may trace the development of the needle from a single one of various shapes to the number of parallel needles now in use. The cap, bowl, and supporting mechanism are also profusely illustrated. The collection is completed by some illustrations of the most improved instruments and devices.

JAMES GORDON STEESE.

PHYSICAL GEOGRAPHY

GENERAL

BERGET, ALPHONSE. **The Earth: Its Life and Death.** Translated by E. W. Barlow. xi and 371 pp. Index. G. P. Putnam's Sons, New York, 1915. $1.75. 8½ x 6.

The volume aims to trace the history of the earth from its birth according to the nebular hypothesis, through its infancy according to the tetrahedral theory, to its death some millions of years hence, and ultimate resurrection to a new life, billions of years later, through a collision of suns in interstellar space. As geographers, we are primarily interested in the earth at its present stage of development, with possibly a secondary interest in certain portions of its past history written in the geological record. Concerning the first, we find in the book chapters on the form and size of the earth, on its magnetism, electricity, and radioactivity, on tides and waves, on oceanic and atmospheric circulation, and on the forces which wear down and build up land masses. As to the second, the remote geological history of the earth is traced in broad outline, and more attention given to earth movements and recent seismic phenomena.

The book has two serious defects: Unproved theories are frequently set forth as definitely ascertained facts, even when, as occasionally happens, the theory has been long abandoned by most scientists as extremely improbable; and well-established facts in the earth's past history have escaped the author's notice, and in their stead the fanciful notions of a bygone day find a place in his picture of earth evolution. Thus we read that in Archean time "the rocks formed were still at a high temperature and the primitive atmospheric condensation brought down scalding liquids" (p. 37), while terrestrial life became possible when the temperature of atmosphere and ocean was lowered to about 140° F. (p. 38). Not until the end of the Tertiary era was the temperature lowered sufficiently for glaciers to make their appearance (p. 45). Ultimately the whole of Central Europe and North America were buried under the ice (p. 46). Seismic disturbances result when the core of the earth shrinks away from the crust or volcanoes emit lava, both operations leaving vacant spaces into which the unsupported crust ultimately falls, producing shocks; also when currents in the liquid core wash against downward projections of the crust and agitate them (pp. 201-202). All of which makes interesting reading, but one wonders how it came to be published in the garb of science.

D. W. JOHNSON.

HOLMES, ARTHUR. **The Age of the Earth.** (Series: Harper's Library of Living Thought.) xii and 196 pp. Ills., index. Harper & Bros., London & New York, 1913. 7 x 4½.

The table of contents includes the following chapters: (1) The Time Element and Its History; (2) Time and Tide in the Solar System; (3) Astronomical Considerations; (4) Work of Denudation; (5) Salinity and Age of the Ocean; (6) Sedimentation and Geological Time; (7) Radioactivity; (8) Thermal Energy of the Sun; (9) Thermal Energy of the Earth; (10) Radioactive Minerals and Their Ages; (11) Review of the Evidence.

This little volume is not so ambitious as its title and table of contents might indicate, yet for a brief and readable résumé of the time problem it is a welcome contribution. About half of the work is given to radioactivity and its application to geological problems, an especially timely and useful topic, since few geologists are able to keep abreast of this line of work. The author inclines towards an enormous estimate of the earth's age and believes that eventually a study of radioactivity will afford an absolute, instead of the present relative, time estimate of the major periods as well as of the total age of the earth. F. V. EMERSON.

GEOLOGY AND GEOMORPHOLOGY

CASE, G. O. **Coast Sand Dunes, Sand Spits, and Sand Wastes.** xiii and 162 pp. Ills., index. St. Bride's Press, London, 1914. 5s. 7½ x 5.

Sand dunes are so abundant along our Atlantic and Pacific coasts, along the shores of our Great Lakes, in many parts of our arid West, to say nothing of their presence over many inland areas and along highways of travel, that they have already become a source of trouble as they march across country burying houses, forests, orchards, railroads, or anything else in their path. It is only recently that the problem of fixing dunes has assumed any importance in the United States, though the subject has received attention in Europe for sixty years.

This little book is intended to show the beneficial results which follow when man works with nature to accumulate and fix the inblown sands in such a way as to provide a permanent protection to the coast. Sand dunes may be fixed in three ways: (1) by planting a belt of suitable grasses and shrubs just above high-water line; (2) by building, or helping nature to build, an embankment of earth or sand; and (3) by constructing a row or series of rows of open-work fences. Sandy wastes are easily converted into pine woods, which may become an important commercial asset.

COLLIER COBB.

FRECH, FRITZ. **Allgemeine Geologie. III: Die Arbeit des fliessenden Wassers.** Eine Einleitung in die physikalische Geologie. 3. erweiterte Auflage von "Aus der Vorzeit der Erde." (Series: Aus Natur und Geisteswelt.) 124 pp. Map, ills. B. G. Teubner, Leipzig, 1914. Mk. 1.25. 7 x 5.

Simple and popular story of the work of land waters, not including the work of ice. The chief value to the teaching geographer is in the examples cited, serviceable for lectures and class-room discussions. Thus to forests are ascribed their full efficiency in preserving land surfaces, and the following striking case is given,—from 1471 to 1776 the French southern Alps lost almost three-fourths of their cultivable ground, with corresponding loss of population.

Referring to one topic out of many: The classification of waterfalls is unsatisfactory, being both incomplete and illogical, as, for example, in assigning all the falls of eastern America to a glaciated-plateau class, typified by Niagara. Regarding falls from hanging valleys in glaciated regions, the commonly accepted explanation is given, but the term, now so generally used with us, is avoided. Half the volume is devoted to surface streams, and the remainder to ground water, under the heads karst and cavern formations, springs, and landslips. The half-tones and other illustrations are numerous but of inferior execution. A. P. BRIGHAM.

DAVIS, W. M. **A Shaler Memorial Study of Coral Reefs.** Ills. *Amer. Journ. of Sci.*, No. 237, Vol. 40, 1915, pp. 223-271.

FALCONER, J. D. **Land Forms and Landscapes.** Maps, ills. *Scott. Geogr. Mag.*, Vol. 31, No. 2, 1915, pp. 57-71; No. 3, pp. 143-151; No. 4, pp. 169-180; No. 5, pp. 244-253; No. 8, pp. 393-406.

GRATACAP, L. P. **A Popular Guide to Minerals.** 330 pp. Map, ills., index. D. Van Nostrand Co., New York, 1912. $3. 9 x 6.

LOPERFIDO, A. **Le cause sismiche.** Bibliogr. *Riv. Geogr. Ital.*, Vol. 22, 1915, No. 7, pp. 321-334.

NÉOUSTROUEFF, S. **Sur les combinaisons des sols dans les plaines et dans les pays montagneux.** *La Pédologie*, Vol. 17, 1915, No. 1, pp. 62-73. Petrograd.

PLATANIA, G. **Marmitte dei giganti di erosione marina.** 7 pp. Ills. *Pubbl. dell' Ist. di Geogr. Fisica e Vulcan. della R. Univ. di Catania No. 2.* Rome, 1915.

WILMORE, ALBERT. **A First Book of Geology.** (Series: First Books of Science.) vii and 141 pp. Ills., index. The Macmillan Co., New York, 1914. 50 cents. 7 x 5.

HYDROGRAPHY AND OCEANOGRAPHY

PAHDE, ADOLF. **Meereskunde.** (Series: Bücher der Naturwissenschaft, herausgegeben von S. Günther.) 190 pp. Diagrs., index. P. Reclam, Jr., Leipzig, 1914. Mk. 1.75. 5½ x 4.

This little book shows how well a great topic may be simplified and condensed and its essentials presented in a way to interest all intelligent readers. In less than 18,000 words Dr. Pahde gives a history of the progress of oceanography, and the contributions made to it by various men and nations; describes the sea basins and tells what is known of their floors, relief, deposits, tides, currents and other movements, thermal conditions, etc. Dr. Pahde's maps, in colors, of currents and surface temperatures, his black-and-white maps, diagrams, tables, and index are all well done and very helpful. A book so efficient and charming as this deserves to be well known in our country.

METEOROLOGY AND CLIMATOLOGY

NEUHAUS, E. **Die Wolken in Form, Färbung und Lage als lokale Wetterprognose.** 48 pp. With separate case of plates. O. Füssli, Zürich, 1915. Fr. 15. 13½ x 10.

The enthusiasm of the author of this new work on clouds is splendid and also contagious. He loves his Swiss mountains and his clouds. He knows his cloud types and their formation, their colors, their significance. He is at home in his subject, as too few of us are. His object is clearly before him. It is to make the results of his observations of practical use to others, in helping them to make their own local weather forecasts.

A forester, who necessarily spends much time outdoors, Dr. Neuhaus has devoted himself for years to a very intimate study of cloud forms and their meanings. It is natural that his results are chiefly of local interest, for clouds in mountain regions are peculiarly susceptible to local influences. Yet no one can read the text of this volume without finding in it many points of interest; and the remarkable cloud photographs, exquisitely reproduced, are real works of art.

Our author has gone into great detail in his scheme of cloud observation and record. Blank tables are given for keeping the results systematically. A color scheme, formulæ, symbols, etc., are presented for the instruction and use of other observers. Frankly, the details of this scheme seem to us too elaborate and too minute for general use. We feel that those who are interested in local cloud observation will usually prefer to work out their own scheme. But the work cannot fail to inspire those who study it with an interest and an enthusiasm for cloud observation. The volume clearly shows what one painstaking and patient observer may contribute to meteorological science. Dr. Neuhaus uses his own descriptive terms for his different cloud forms, but the general equivalents in the international classification are shown in a comparative table.

R. DEC. WARD.

REED, W. G. **Note on the Effects of Raingage Exposures.** Map. *Monthly Weather Rev.*, Vol. 43, 1915, No. 7, pp. 318-322.

HUMAN GEOGRAPHY

GENERAL

DITZEL, H. **Die Weltbevölkerung.** Diagrs. *Geogr. Anzeiger*, Vol. 16, 1915, No. 10, pp. 294-296. Gotha. [An evaluation of the accuracy of population estimates of the continents (North and South America counted as one) from 1804 to 1910. Two graphs illustrate (1) the mean rate of growth according to these estimates, and (2) the probable rate of growth based on the estimates of the last decades, which are more trustworthy because of census enumerations. The untrustworthiness of earlier estimates is illustrated by the first curve for Africa, which, starting at 70,000,000 in 1804, increases to 205,000,000 in 1880, and then drops to 130,000,000 in 1910. The probable values for these three years, as illustrated by the second curve, are 60,000,000, 110,000,000 and 155,000,000, exhibiting a normal, steady growth.]

ANTHROPOLOGY AND ETHNOGRAPHY

DU BOIS, W. E. B. **The Negro.** (Series: Home University Library.) 254 pp. Maps. Henry Holt & Co., New York, 1915. 50 cents. 6½ x 4½.

Doctor Du Bois here presents the main known facts in the history of the negro. Many of these facts should have been better known long ago, as they concern a race numbering about one-sixth of human kind, with nearly half the world as the theater of its achievements, misfortunes, and tragedy. The author most emphasizes the terrible handicap that, for centuries, other races have imposed upon the negro, and he proves his case, though his selection of data is not always critical and some of his statements of fact are open to criticism. He is mistaken in specifying (p. 159) the cocoa plantations of the Portuguese islands in the Gulf of Guinea and the "Congo Free State" as centers of "actual slave trading." Portuguese methods of dealing with field laborers on these plantations is a scandal which will some day be ventilated and the nuisance abated; but slave trading and its forerunner, raiding for slaves, have been practically wiped out everywhere in Africa. The last stronghold of slave raiding—in Wadai—was suppressed by the French in 1909-1910. On the whole, the book is an able exposition of Doctor Du Bois' theme, and he deserves all the greater credit because it is very difficult to treat so large a subject in space so limited.

FRANKE, CARL. **Die mutmassliche Sprache der Eiszeitmenchen in allgemein verständlicher Darstellung.** 2nd edit. 112 pp. Buchhandlung des Waisenhauses, Halle a.d.S., 1913. Mk. 3. 9½ x 6½.

This work is noteworthy for the facts it offers toward the study of a theme which calls for careful research—the evolution of the speech faculty in man. From the rugosities on the lower mandibles, preserved from the glacial epochs, comparative anatomists have derived the conclusion that man of that period was incapable of human speech. This is an essay toward the establishment of the beginning and development of the muscular ability to frame the closures of the buccal cavity. It is the facility in the formation of such closures which endows man with a more or less rich consonantal modulation of the open-throated vowel sounds and thereby sets human speech above the animal cry as a means whereby thought may be communicated. This theme of the evolution of speech is yet so new that none of the two or three of us who are working upon it may feel sure that he has hit upon the right method; but it is important that work is being done and any method in this beginning stage is quite as valuable as any other. This is an important contribution to the theme and should serve as a stimulus to further inquiry.

WILLIAM CHURCHILL.

HEILBORN, ADOLF. **Allgemeine Völkerkunde.** Vol. 1: **Feuer, Nahrung, Wohnung, Schmuck und Kleidung.** viii and 136 pp. Ills. Vols. 2: **Waffen und Werkzeuge. Industrie, Handel und Geld, Verkehrsmittel.** viii and 116 pp. Ills. (Series: Aus Natur und Geisteswelt.) B. G. Teubner, Leipzig, 1915. Mk. 1.25 each. 7 x 5.

This work is a revised sketch of an earlier volume (1878). The author puts weight on the development idea proper to the naturalist, in distinction from the anthropologist, who looks more at the systematic position of man among the primates. The culture of all times can be rightfully studied only in the light of its evolution. Accordingly the geographical-historical viewpoint is definitely assumed. "Ground and climate determine more than all else the weal and woe of peoples." Nature and culture peoples find their essential difference in the way in which thy are linked to the earth. Culture is the gradual emancipation from the contingencies of nature by development and inheritance through generations.

The development of culture in man is regarded as the natural function of environment. Apparent approval is accorded to a sentiment quoted from Frederick the Great,—"All culture proceeds from the stomach." Material and intellectual culture are not to be put in sharp contrast. Material culture is the ground of the intellectual, and, on the other hand, intellectual progress is generally accompanied by material achievements. These observations occur in an opening chapter on the nature and evolution of culture.

Other parts of the first volume deal with fire, food, habitation, and dress. The second volume has chapters on weapons, handicrafts, trade and money, and on means of transportation. The work is quite fully illustrated and each volume contains a bibliography.

A. P. BRIGHAM.